The Periodic Table
and the Elements

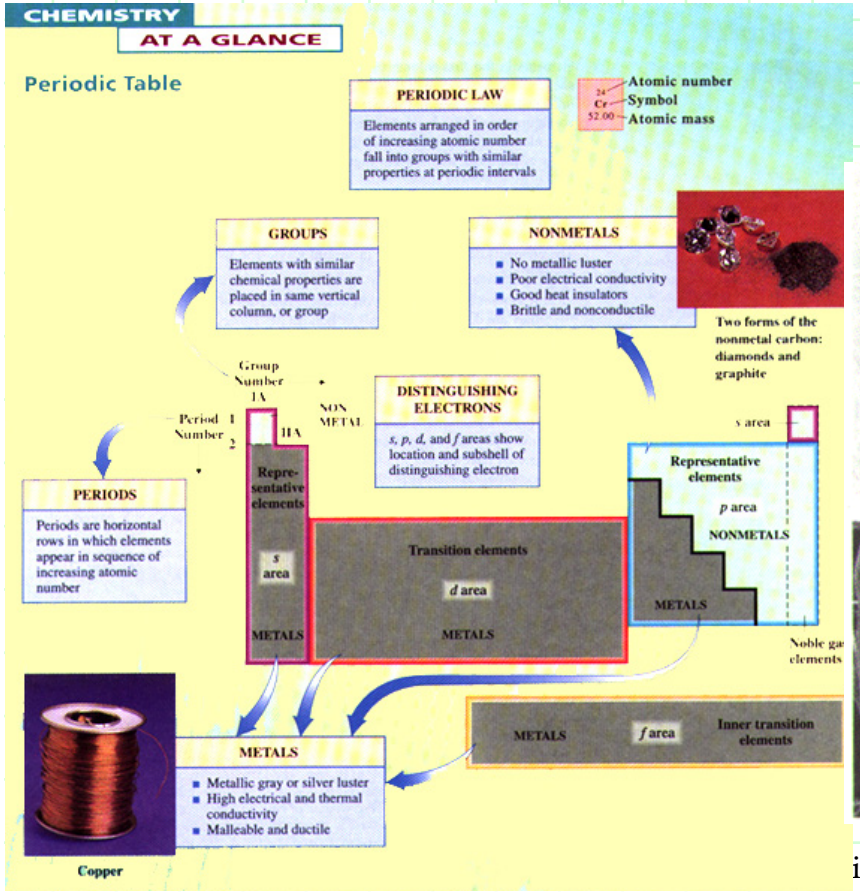
Physical Science
DSHS

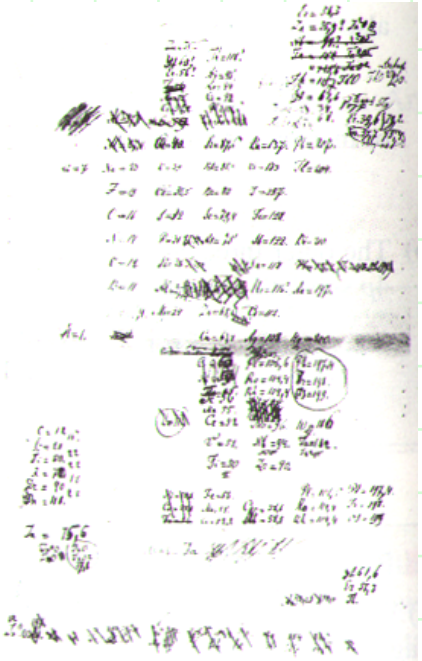
The Periodic Table and the Elements

What is the periodic table ?

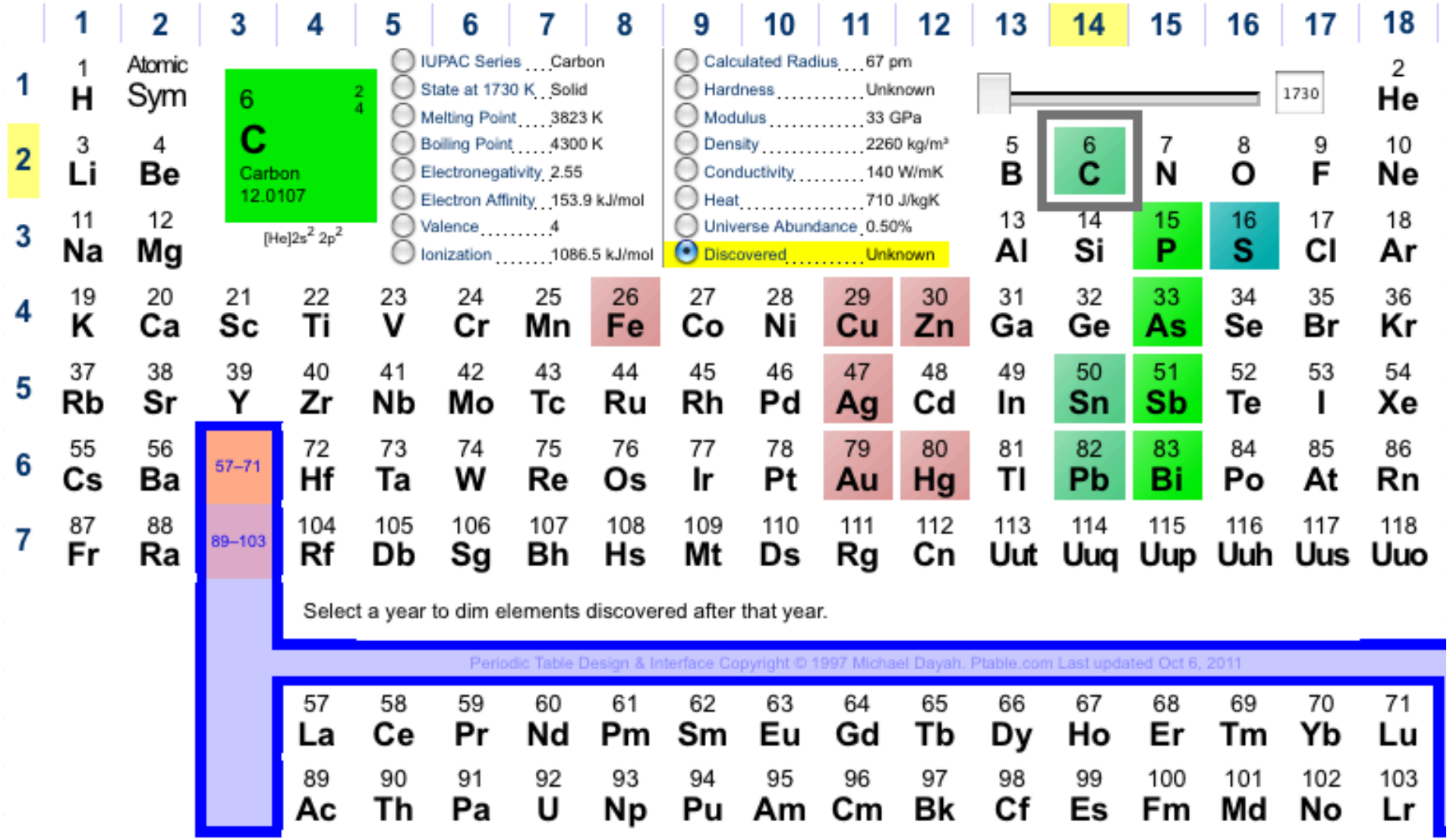
What information is obtained from the table ?

How can elemental properties be predicted base on the PT ?





Known Elements in 1730's

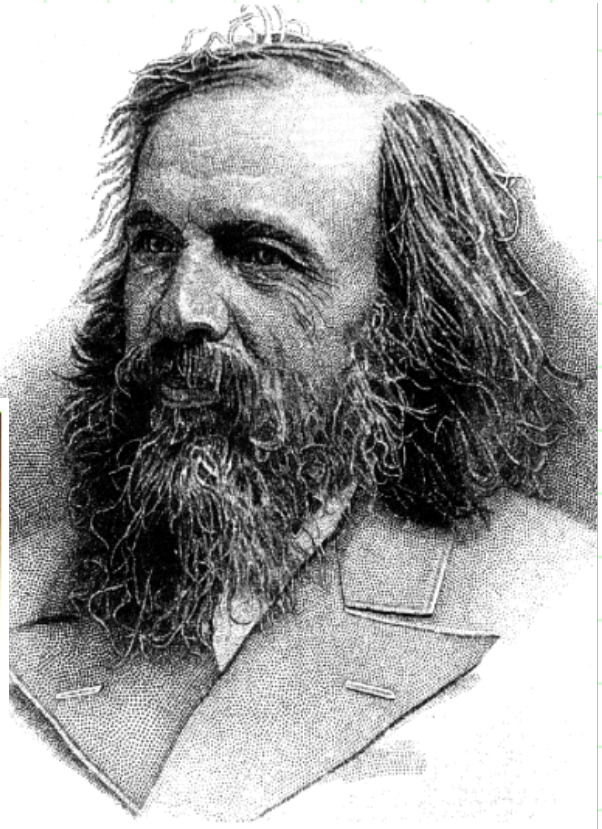


_____ _____ (1869)

In 1869 Mendeleev and Lothar Meyer (Germany) published nearly identical classification schemes for elements known to date. The periodic table is base on the similarity of properties and reactivities exhibited by certain elements. Later, Henri Moseley (England,1887-1915) established that each elements has a unique atomic number, which is how the current periodic table is organized.

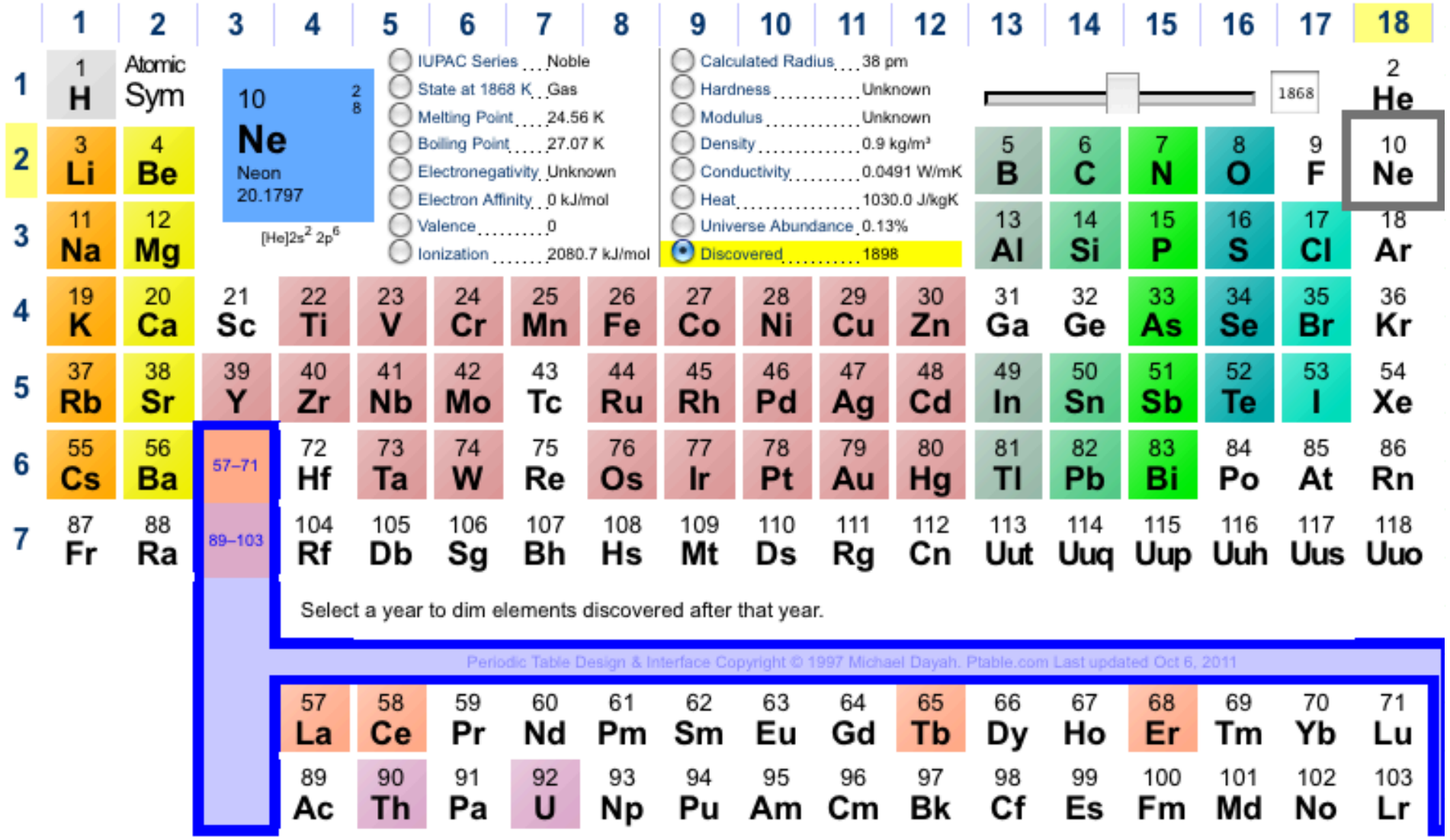
Row	Group I — R_2O	Group II — RO	Group III — R_2O_3	Group IV RH_4 RO_2	Group V RH_3 R_2O_5	Group VI RH_2 RO_3	Group VII RH R_2O_7	Group VIII — RO_4
1	H = 1							
2	Li = 7	Be = 9.4	B = 11	C = 12	N = 14	O = 16	F = 19	
3	Na = 23	Mg = 24	Al = 27.3	Si = 28	P = 31	S = 32	Cl = 35.5	
4	K = 39	Ca = 40	— = 44	Ti = 48	V = 51	Cr = 52	Mn = 55	Fe = 56, Co = 59, Ni = 59, Cu = 63
5	(Cu = 63)	Zn = 65	— = 68	— = 72	As = 75	Se = 78	Br = 80	
6	Rb = 85	Sr = 87	?Yt = 88	Zr = 90	Nb = 94	Mo = 96	— = 100	Ru = 104, Rh = 104, Pd = 106, Ag = 108
7	(Ag = 108)	Cd = 112	In = 113	Sn = 118	Sb = 122	Te = 125	I = 127	
8	Cs = 133	Ba = 137	?Di = 138	?Ce = 140				
9								
10			?Er = 178	?La = 180	Ta = 182	W = 184		Os = 195, Ir = 197, Pt = 198, Au = 199
11	(Au = 199)	Hg = 200	Tl = 204	Pb = 207	Bi = 208			
12				Th = 231		U = 240		

http://www.chem.msu.su/eng/misc/mendeleev/welcome.html



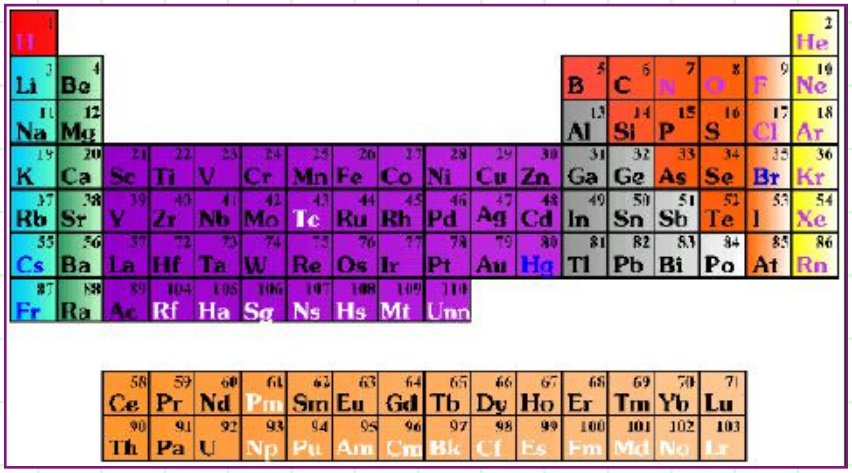
Mendeleev.

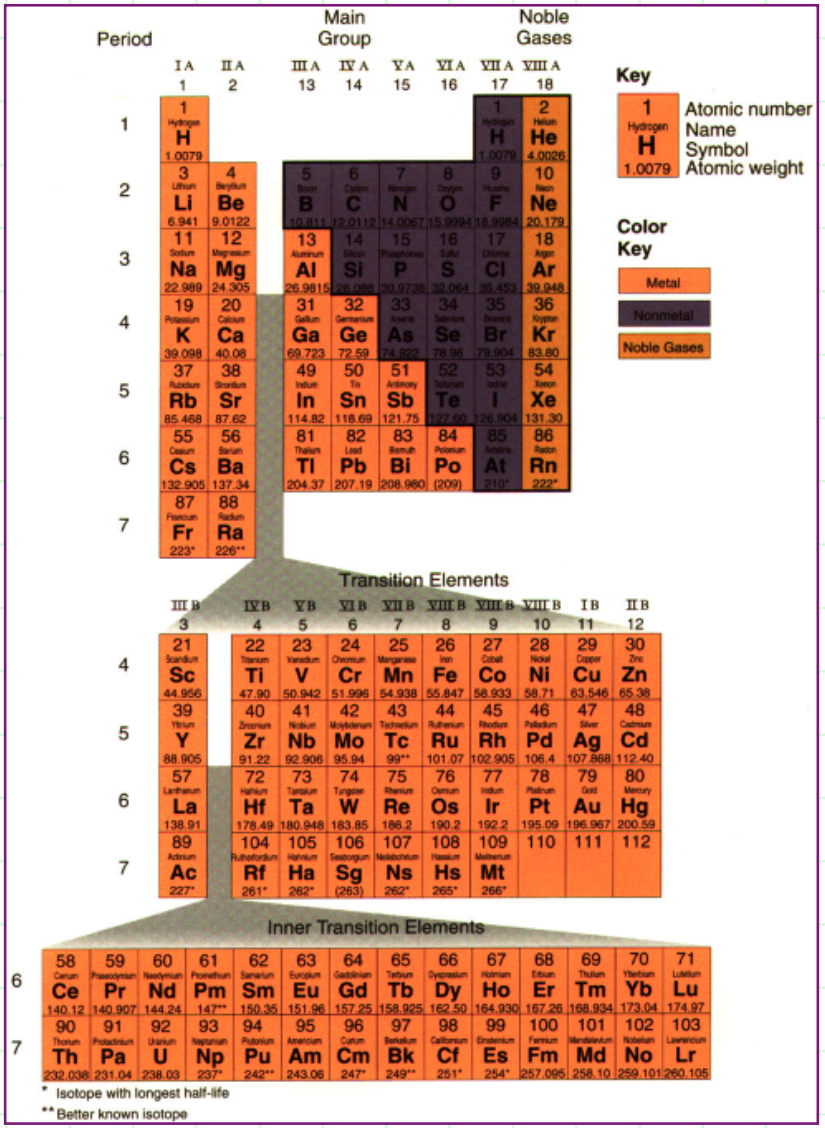
Known Elements in 1870's



Periodic Table Expanded View

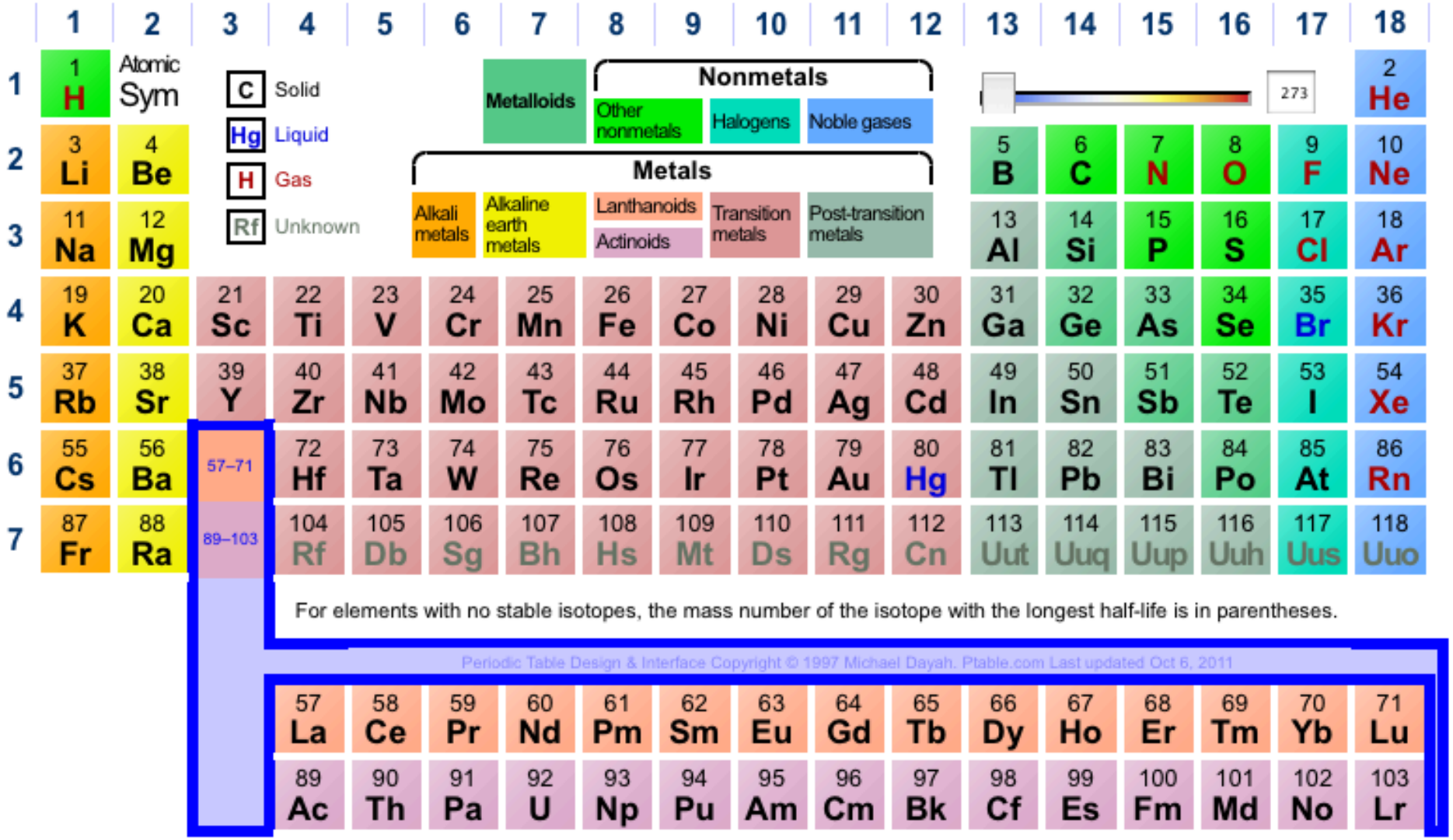
The Periodic Table was not always the way we see it. It has gone though many changes through the years. The most significant was the rearrangement of the Transition elements.





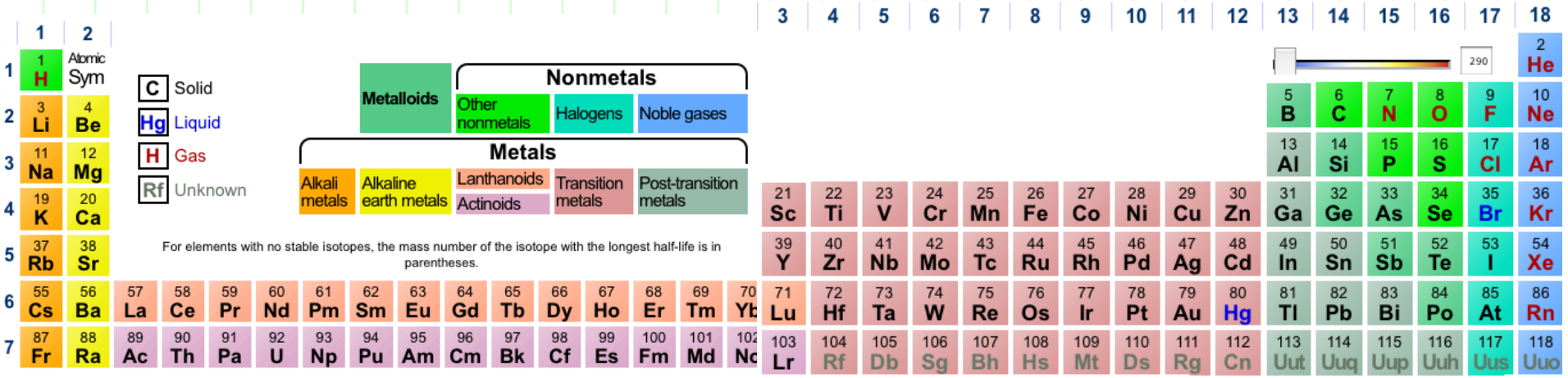
The Periodic Table

A map of the building blocks of matter.



The Periodic Table

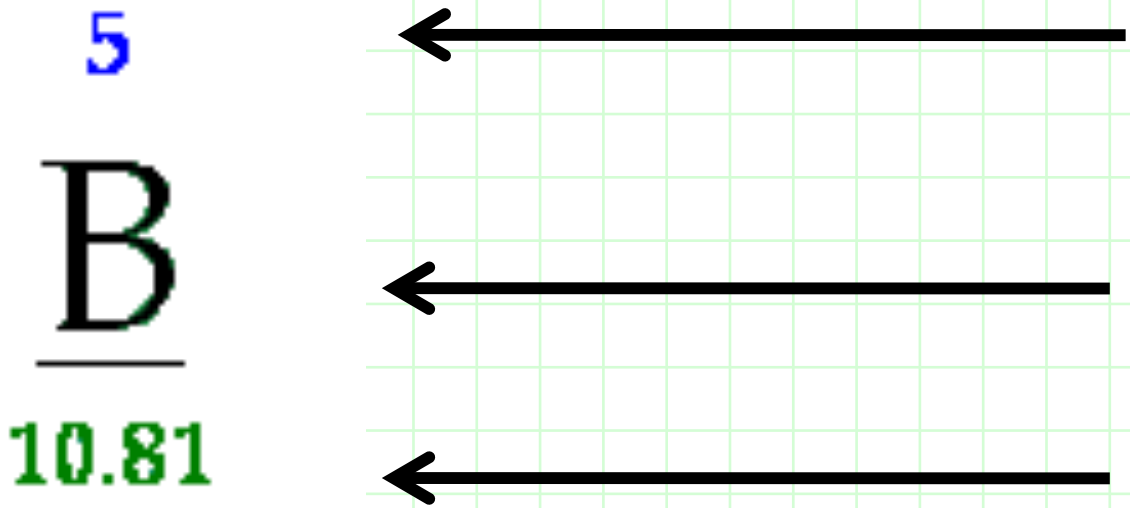
WHY DON'T WE DISPLAY



THE PT THIS WAY?

Describe how to read the periodic table:

Every square on the table has:



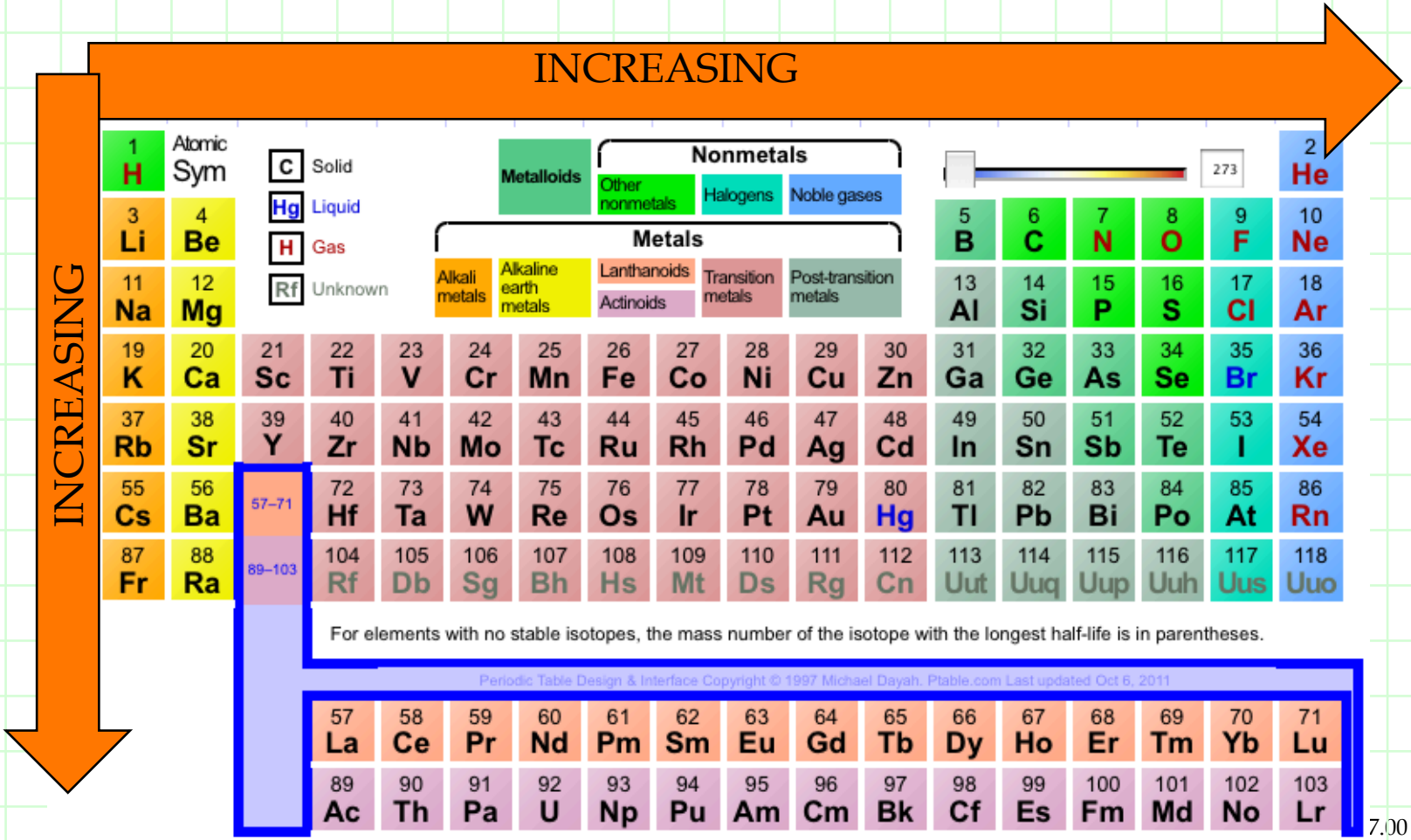
Notice that the atomic mass is not a whole number….. That is because it is an _____. This is the sum of the masses of all isotopes of that element multiplied by their natural abundance.

_____ _____ & _____ _____

Increase as you move…

LEFT TO RIGHT

TOP TO BOTTOM

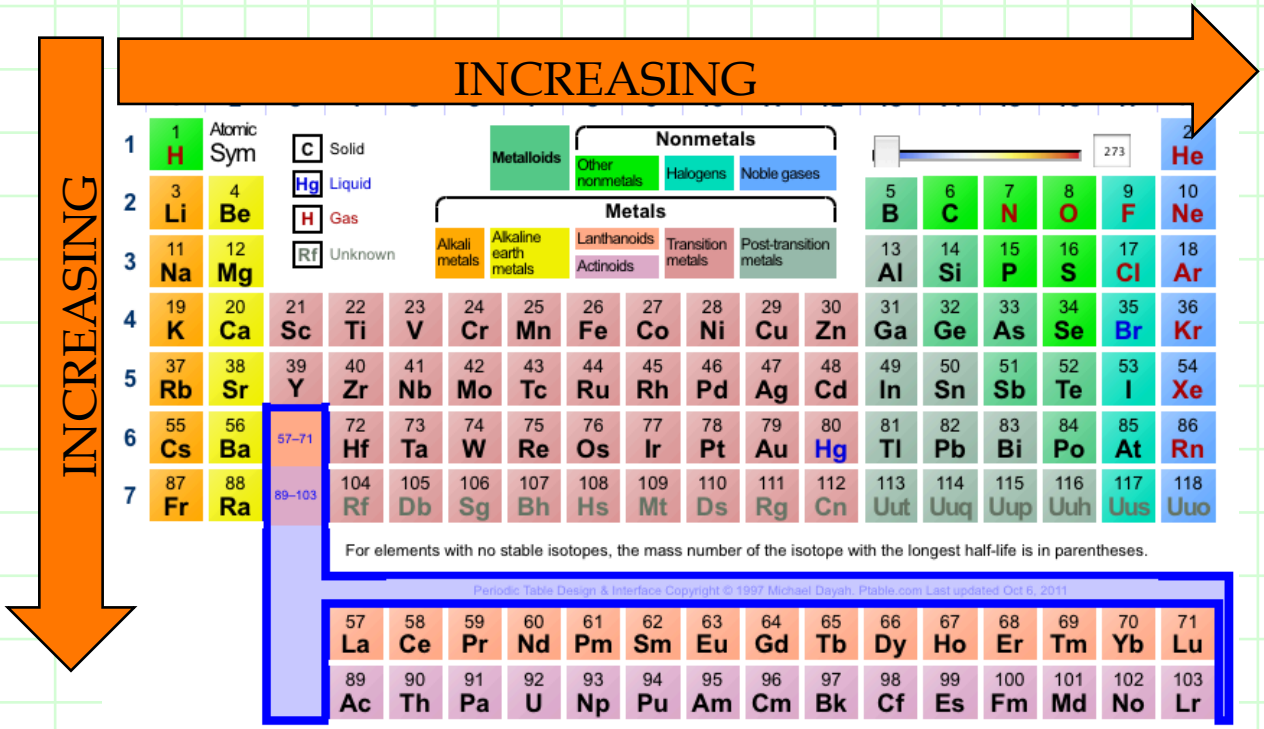


Describe the Periodic Table

Like the Protons and Neutrons, the

Total # of _____

also increase on the PT as the as the Atomic # and Mass increase.

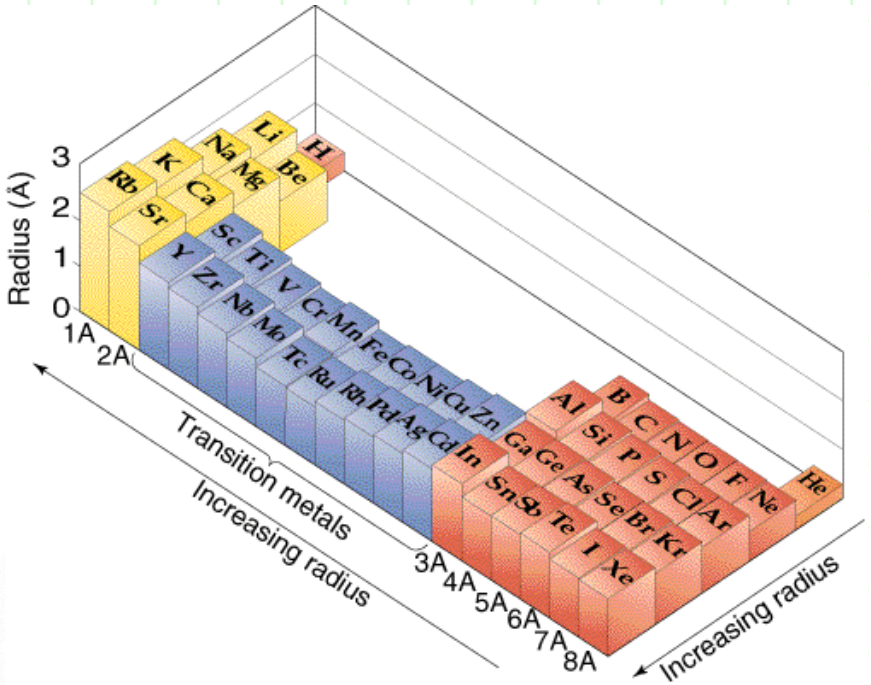


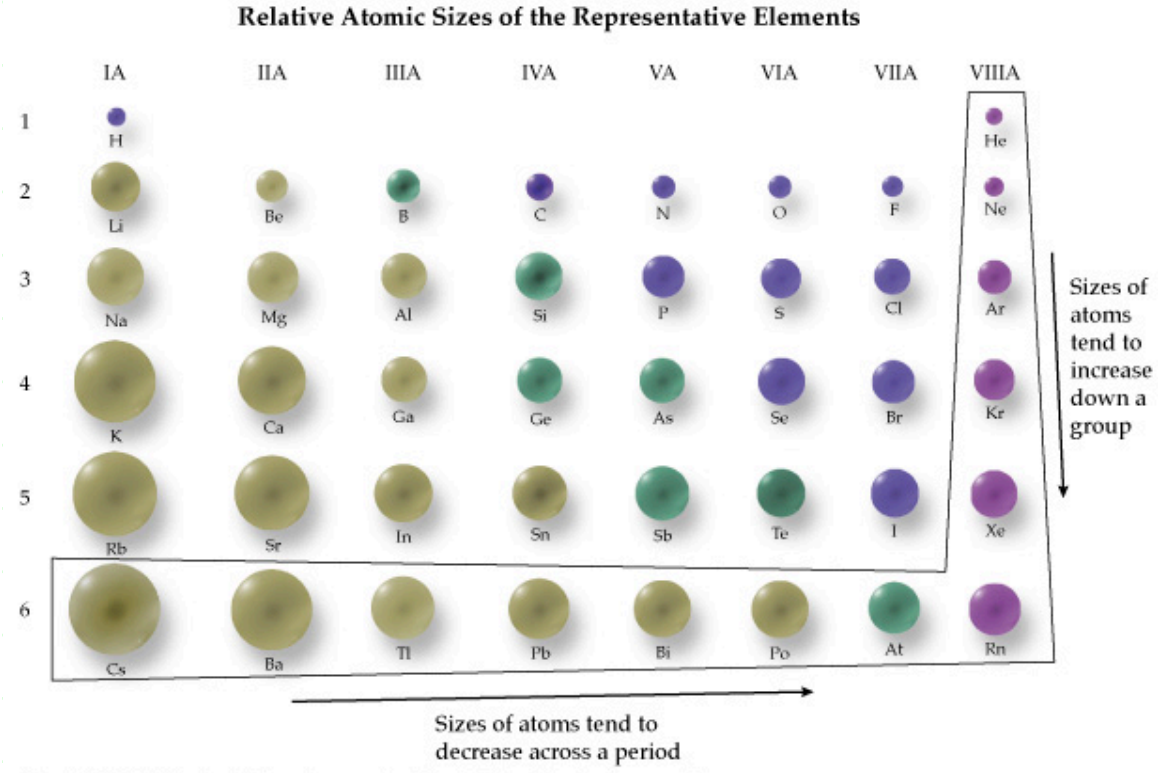
Trend in _____ _____

WARNING:

NOT THE SAME AS ATOMIC # AND MASS

WHY?





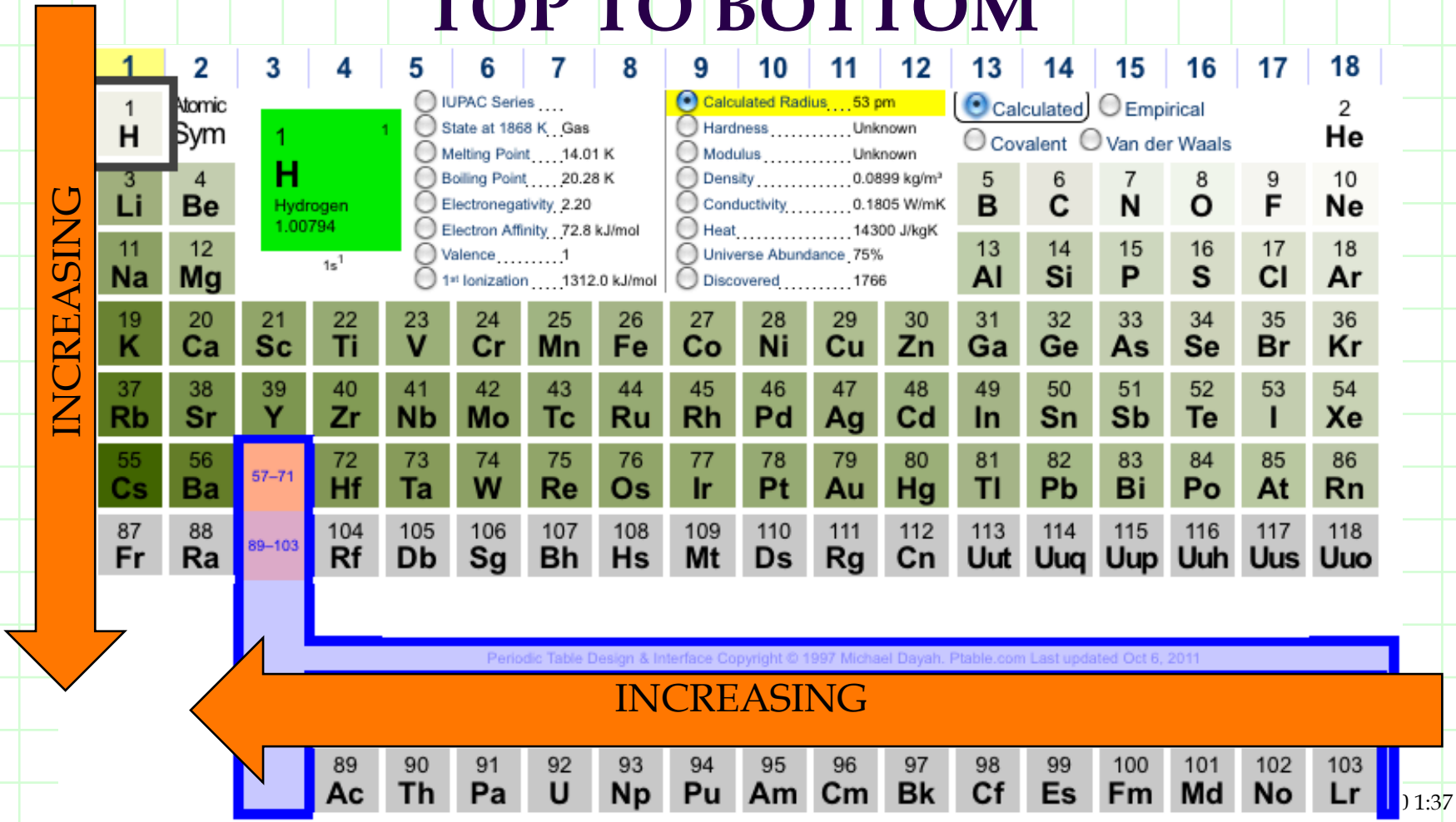
9.17.00 1:37 PM

Trend in Atomic Radius

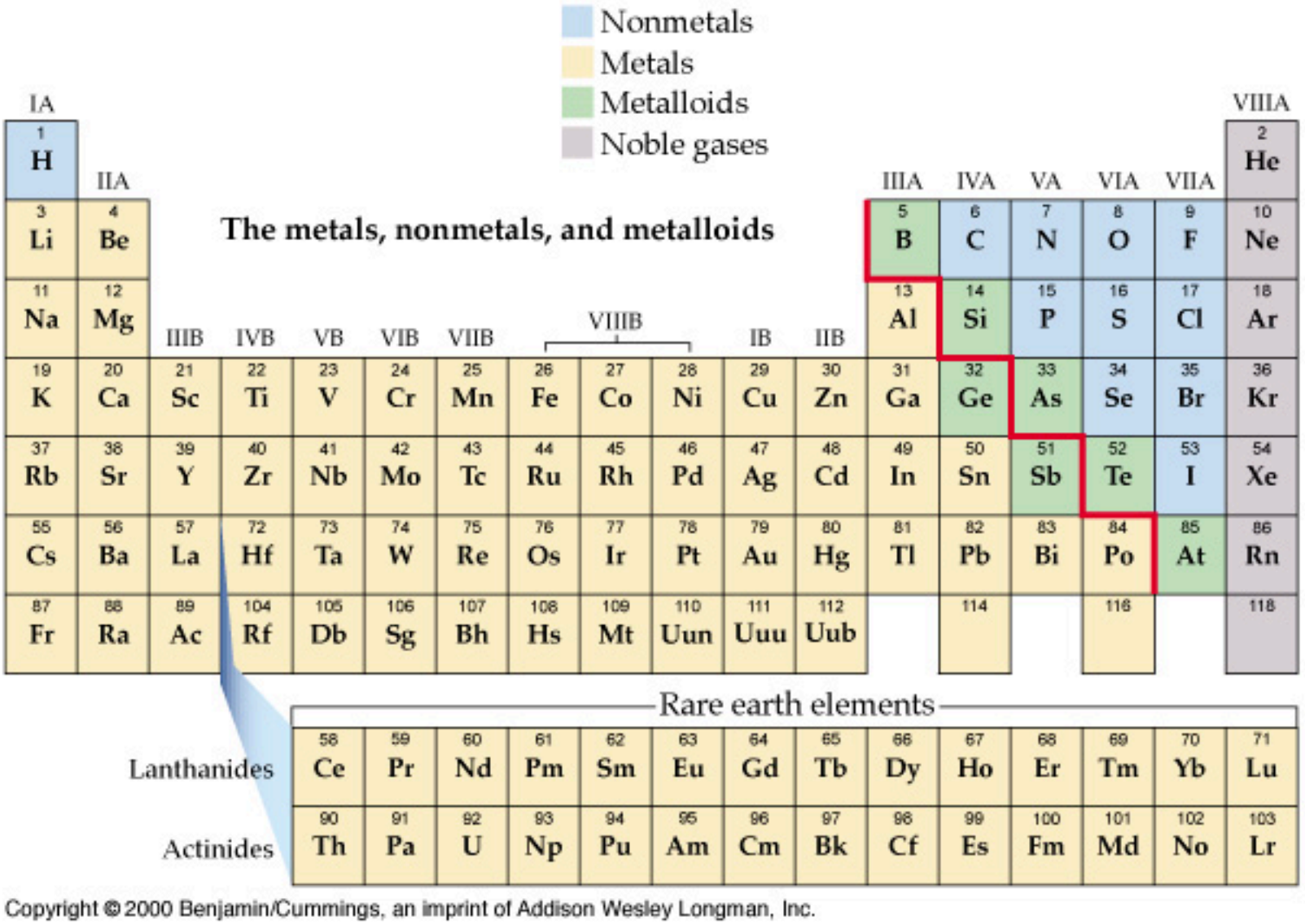
Increase as you move…

RIGHT TO LEFT

TOP TO BOTTOM

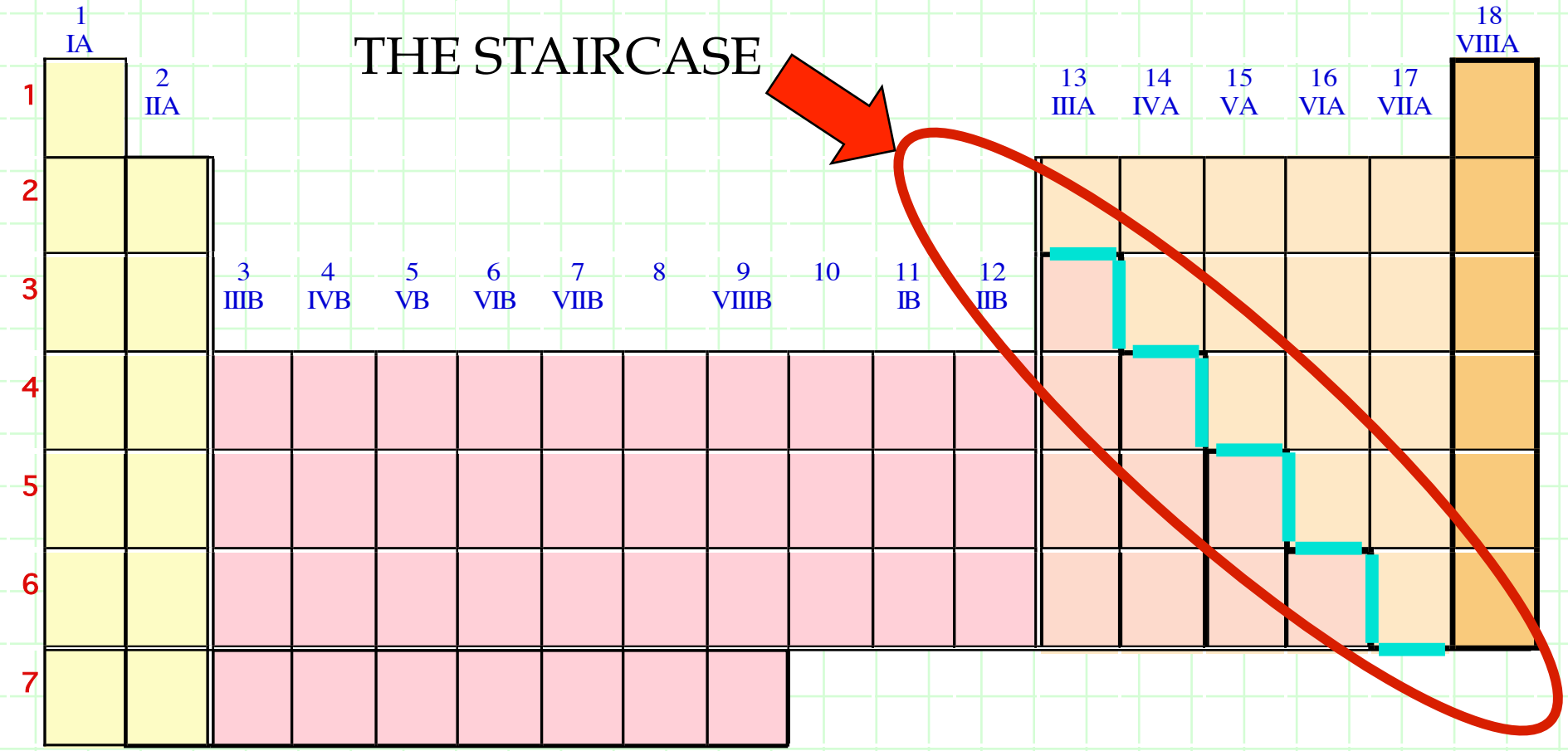


Reading the Periodic Table: Classification



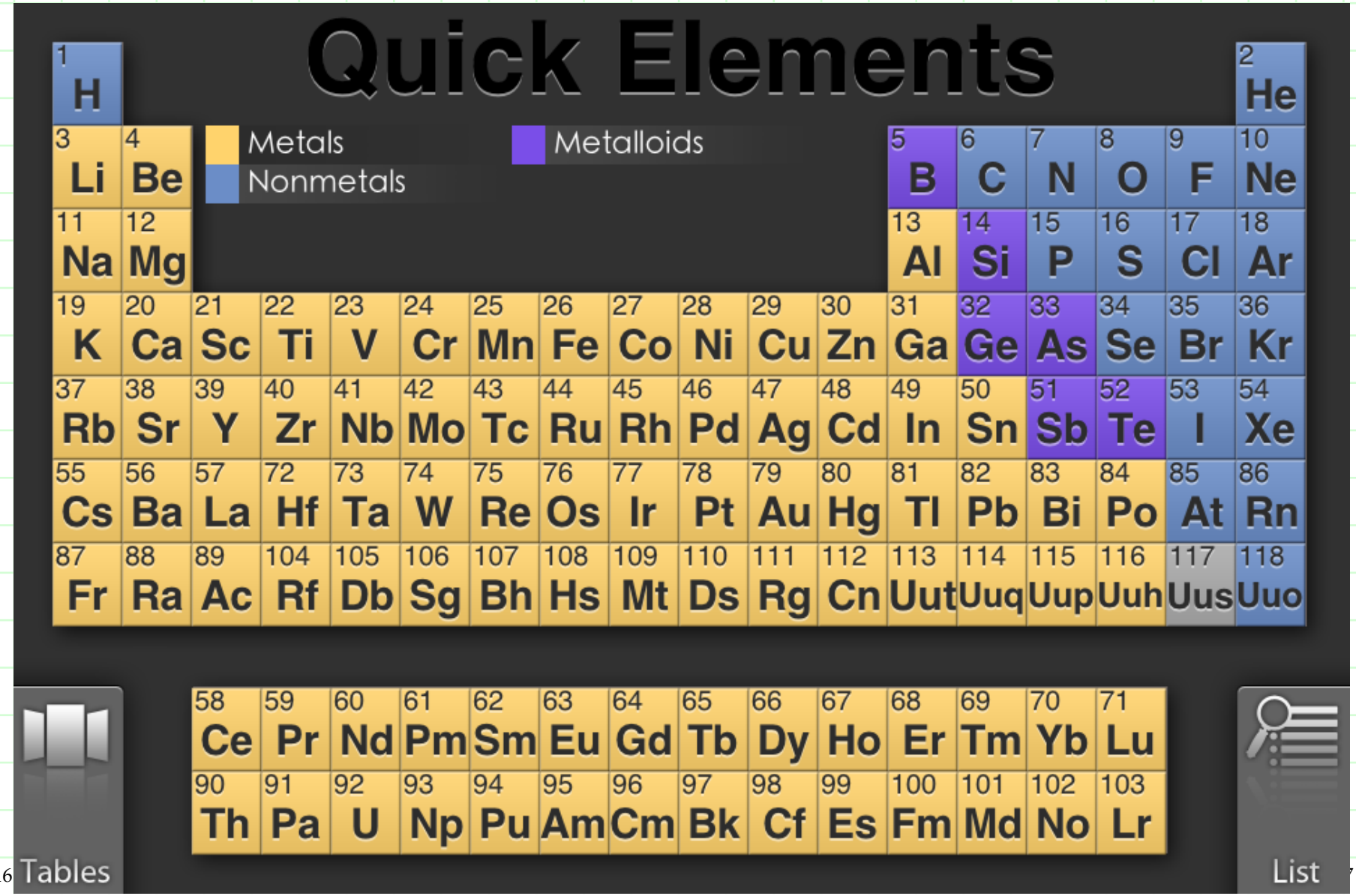
Periodic Table: Metallic arrangement

Layout of the Periodic Table: Metals vs. nonmetals



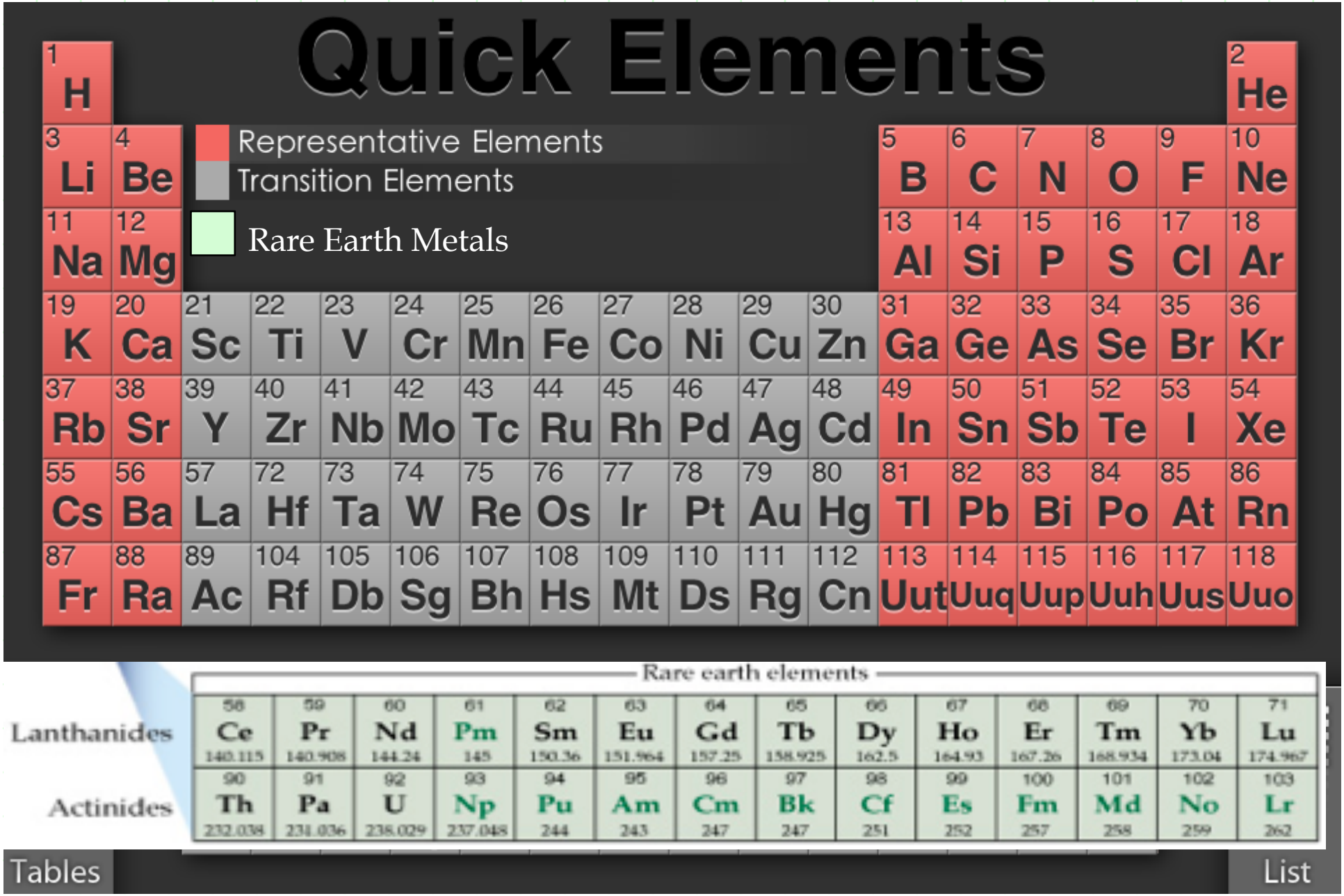
Periodic Table: Metallic arrangement

Layout of: Metals vs. Nonmetals vs. Metalloids



Periodic Table: The three broad Classes

Main (Representative), Transition metals, lanthanides and actinides (rare earth)



Describe the Periodic Table

Rows (and/or PERIODS) –

Elements of each row have the same number of _____ energy levels (shells).

Columns (and/or GROUPS /FAMILIES)-

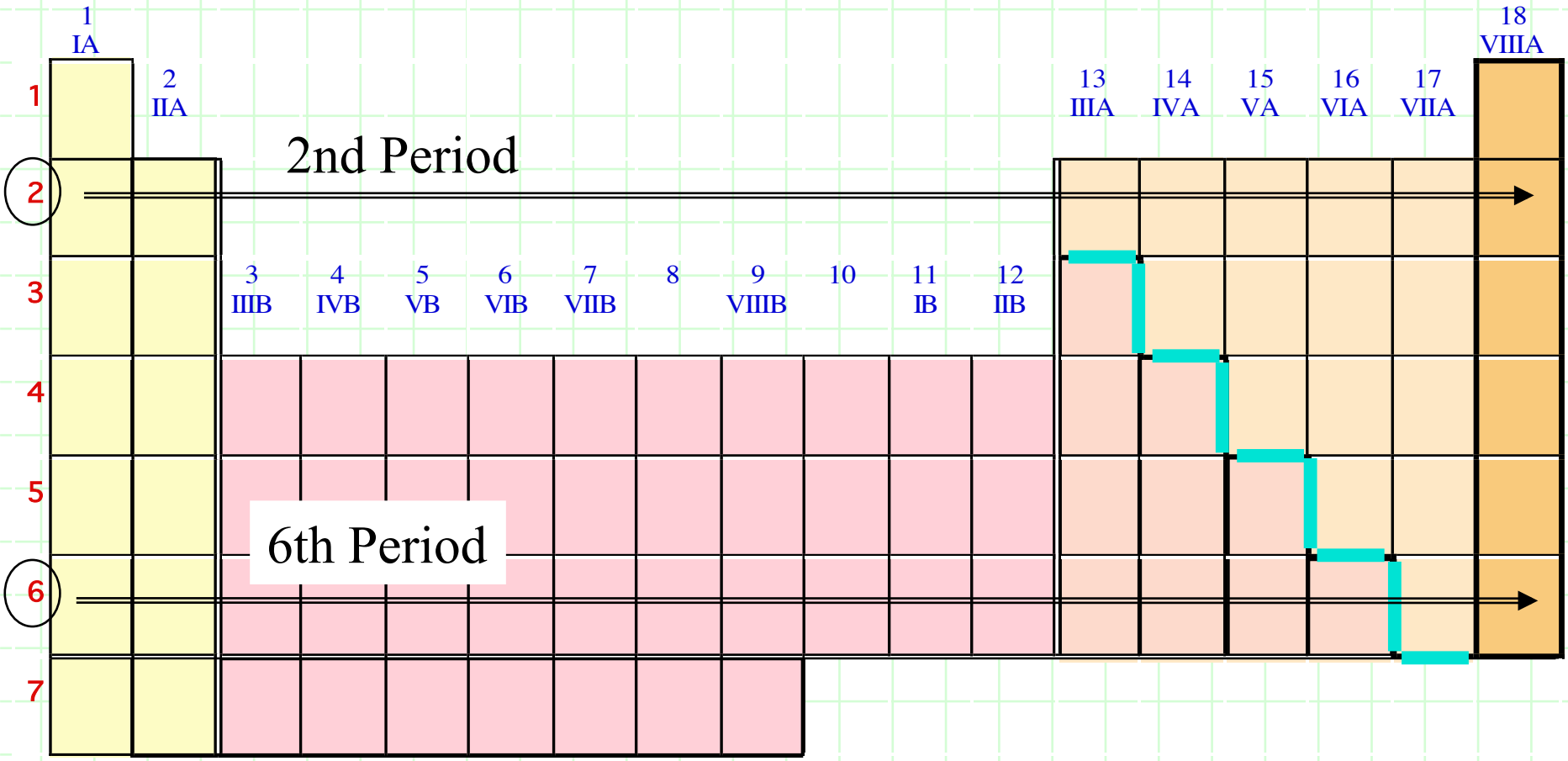
Elements have the same number of electrons in the _____ energy level or shell (Patten for Representative/Main Groups Only).

Elements in the same family have similar properties

Across the Periodic Table

Periods: Are arranged horizontally across the periodic table (Rows 1-7)

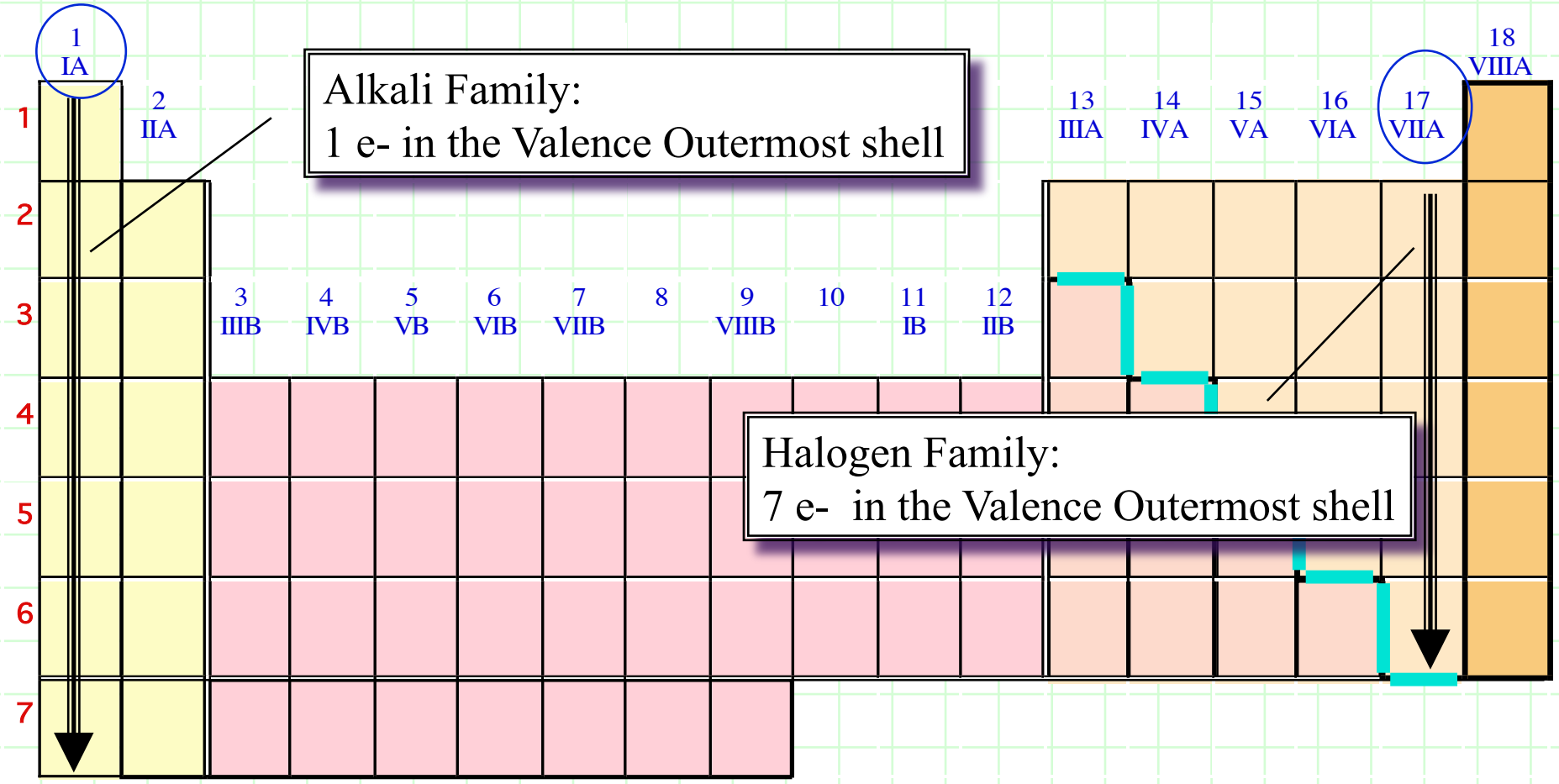
These elements have the same number of Total Energy Levels or shells.



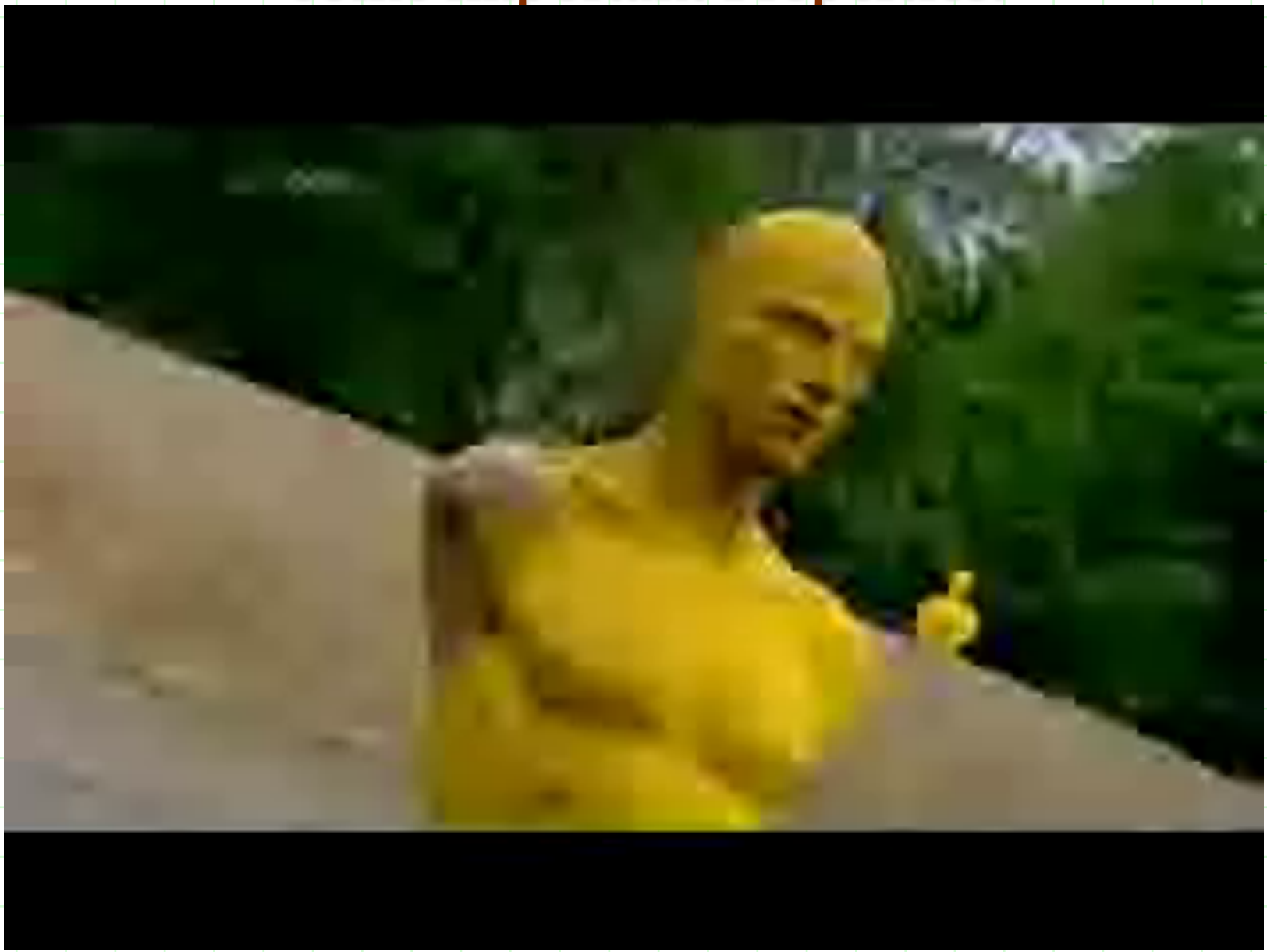
Down the Periodic Table

Families: or groups, 1- 18 or 1-8 (MAIN)]

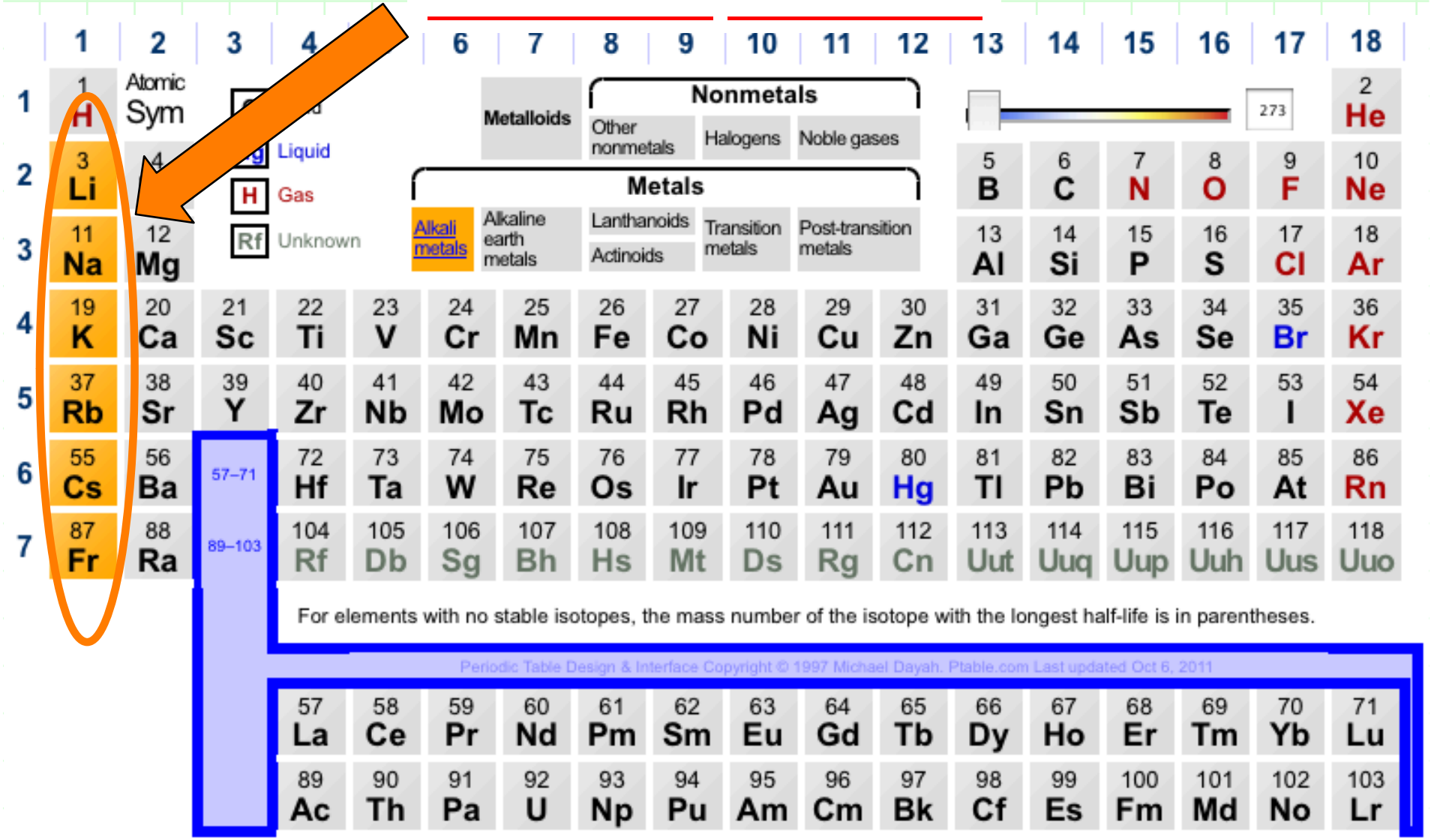
These elements have the same number of electrons in the outermost shells (the Valence shell).



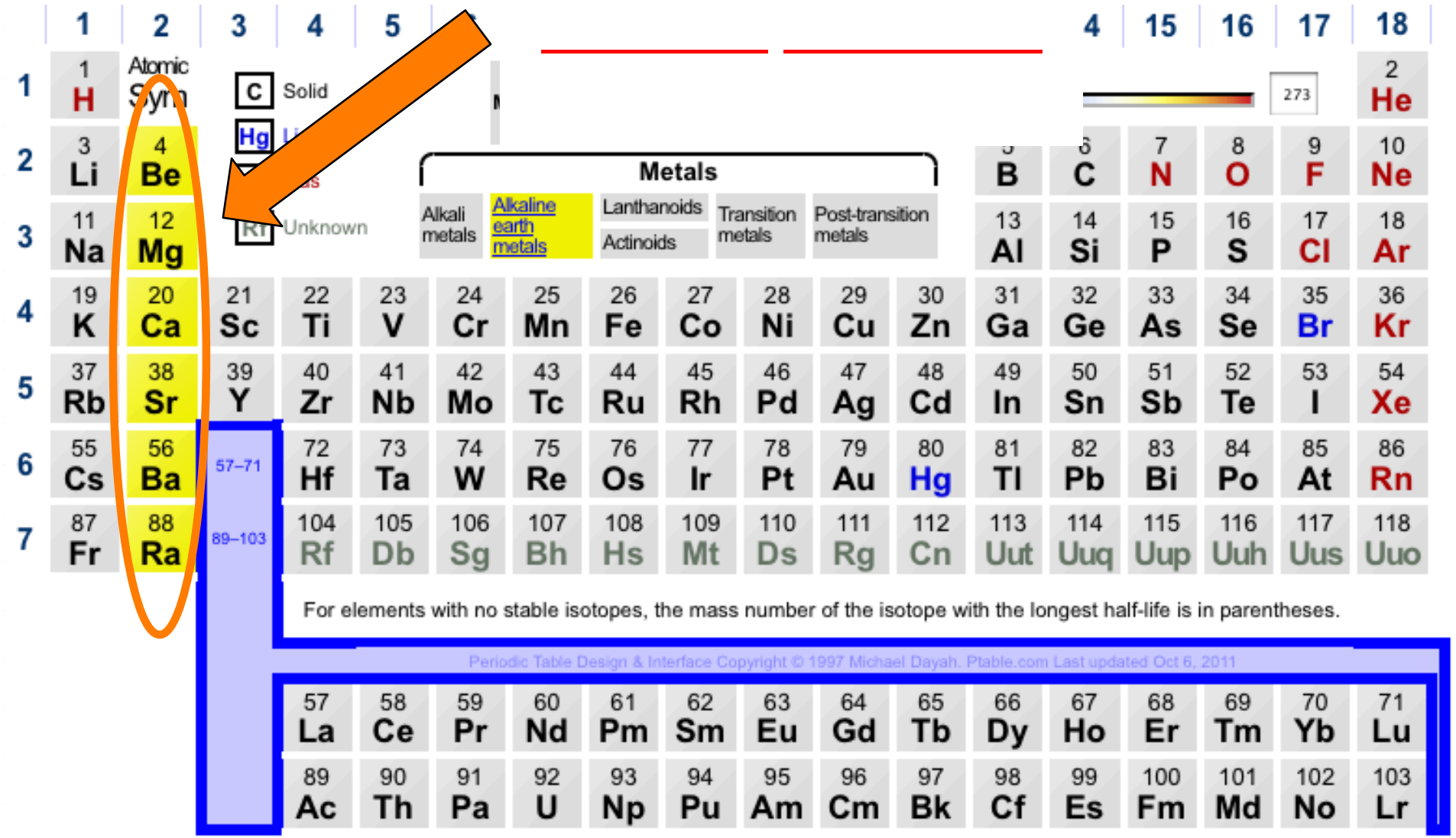
Notable families of the Periodic Table and some important Properties:



Infamous Families of the Periodic Table



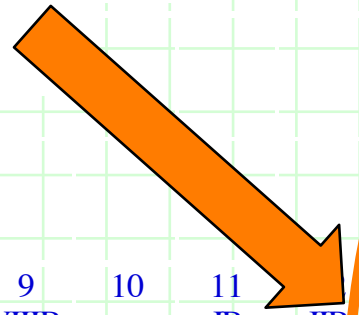
Infamous Families of the Periodic Table



Infamous Families of the Periodic Table

Family #3

(The _____ Family)

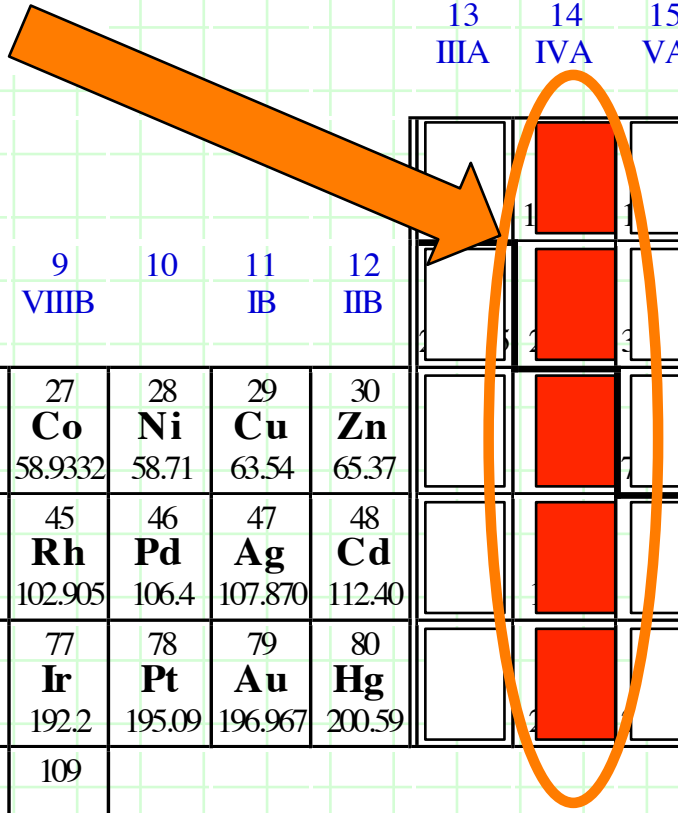


	1 IA	2 IIA	3 IIIB	4 IVB	5 VB	6 VIB	7 VIIB	8	9 VIIIB	10	11 IB	12 IIB	13 IIIA	14 IVA	15 VA	16 VIA	17 VIIA	18 VIIIA
1	1 **H** 1.00797																	2 **He** 4.0026
2	3 **Li** 6.939	4 **Be** 9.0122															9 **F** 18.9984	10 **Ne** 20.179
3	11 **Na** 22.9898	12 **Mg** 24.305															17 **Cl** 35.453	18 **Ar** 39.948
4	19 **K** 39.102	20 **Ca** 40.08	21 **Sc** 44.956	22 **Ti** 47.90	23 **V** 50.942	24 **Cr** 51.996	25 **Mn** 54.9380	26 **Fe** 55.847	27 **Co** 58.9332	28 **Ni** 58.71	29 **Cu** 63.54	30 **Zn** 65.37					35 **Br** 79.909	36 **Kr** 83.80
5	37 **Rb** 85.47	38 **Sr** 87.62	39 **Y** 88.905	40 **Zr** 91.22	41 **Nb** 92.906	42 **Mo** 95.94	43 **Tc** [99]	44 **Ru** 101.07	45 **Rh** 102.905	46 **Pd** 106.4	47 **Ag** 107.870	48 **Cd** 112.40					53 **I** 126.904	54 **Xe** 131.30
6	55 **Cs** 132.905	56 **Ba** 137.34	57 **La** 138.91	72 **Hf** 178.49	73 **Ta** 180.948	74 **W** 183.85	75 **Re** 186.2	76 **Os** 190.2	77 **Ir** 192.2	78 **Pt** 195.09	79 **Au** 196.967	80 **Hg** 200.59					85 **At** [210]	86 **Rn** [222]
7	87 **Fr** [223]	88 **Ra** [226]	89 **Ac** [227]	104 **Ku** [260]	105	106	107	108	109									

Infamous Families of the Periodic Table

Family #4

(The _____ Family)

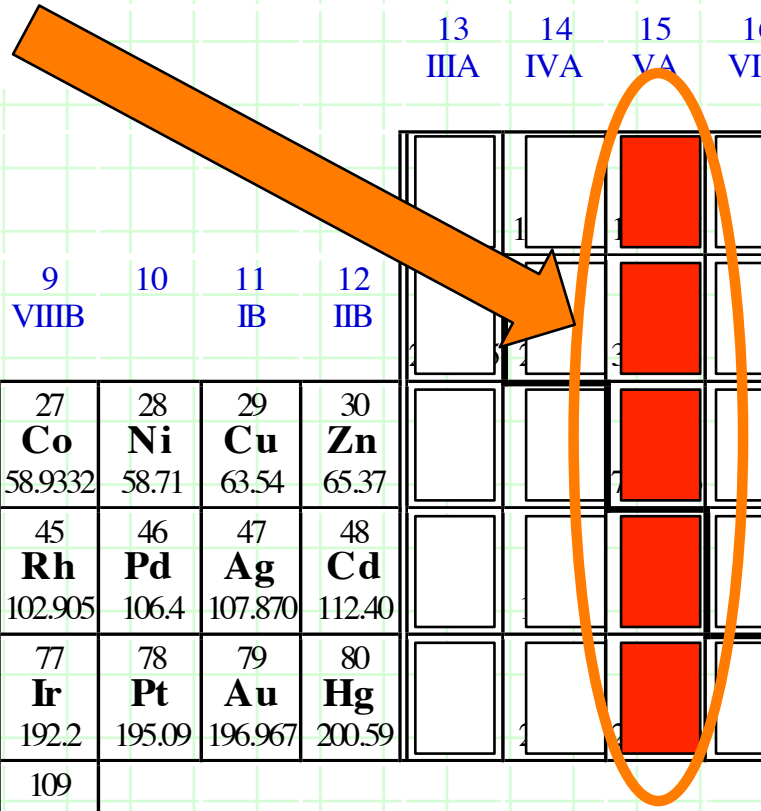


	1 IA	2 IIA	3 IIIB	4 IVB	5 VB	6 VIB	7 VIIB	8	9 VIIIB	10	11 IB	12 IIB	13 IIIA	14 IVA	15 VA	16 VIA	17 VIIA	18 VIIIA
1	1 **H** 1.00797																	2 **He** 4.0026
2	3 **Li** 6.939	4 **Be** 9.0122															9 **F** 18.9984	10 **Ne** 20.179
3	11 **Na** 22.9898	12 **Mg** 24.305															17 **Cl** 35.453	18 **Ar** 39.948
4	19 **K** 39.102	20 **Ca** 40.08	21 **Sc** 44.956	22 **Ti** 47.90	23 **V** 50.942	24 **Cr** 51.996	25 **Mn** 54.9380	26 **Fe** 55.847	27 **Co** 58.9332	28 **Ni** 58.71	29 **Cu** 63.54	30 **Zn** 65.37					35 **Br** 79.909	36 **Kr** 83.80
5	37 **Rb** 85.47	38 **Sr** 87.62	39 **Y** 88.905	40 **Zr** 91.22	41 **Nb** 92.906	42 **Mo** 95.94	43 **Tc** [99]	44 **Ru** 101.07	45 **Rh** 102.905	46 **Pd** 106.4	47 **Ag** 107.870	48 **Cd** 112.40					53 **I** 126.904	54 **Xe** 131.30
6	55 **Cs** 132.905	56 **Ba** 137.34	57 **La** 138.91	72 **Hf** 178.49	73 **Ta** 180.948	74 **W** 183.85	75 **Re** 186.2	76 **Os** 190.2	77 **Ir** 192.2	78 **Pt** 195.09	79 **Au** 196.967	80 **Hg** 200.59					85 **At** [210]	86 **Rn** [222]
7	87 **Fr** [223]	88 **Ra** [226]	89 **Ac** [227]	104 **Ku** [260]	105	106	107	108	109									

Infamous Families of the Periodic Table

Family #5

(The _____ Family)



	1 IA	2 IIA	3 IIIB	4 IVB	5 VB	6 VIB	7 VIIB	8	9 VIIIB	10	11 IB	12 IIB	13 IIIA	14 IVA	15 VA	16 VIA	17 VIIA	18 VIIIA
1	1 **H** 1.00797																	2 **He** 4.0026
2	3 **Li** 6.939	4 **Be** 9.0122															9 **F** 18.9984	10 **Ne** 20.179
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5	37 **Rb** 85.47	38 **Sr** 87.62	39 **Y** 88.905	40 **Zr** 91.22	41 **Nb** 92.906	42 **Mo** 95.94	43 **Tc** [99]	44 **Ru** 101.07	45 **Rh** 102.905	46 **Pd** 106.4	47 **Ag** 107.870	48 **Cd** 112.40					53 **I** 126.904	54 **Xe** 131.30
6	55 **Cs** 132.905	56 **Ba** 137.34	57 **La** 138.91	72 **Hf** 178.49	73 **Ta** 180.948	74 **W** 183.85	75 **Re** 186.2	76 **Os** 190.2	77 **Ir** 192.2	78 **Pt** 195.09	79 **Au** 196.967	80 **Hg** 200.59					85 **At** [210]	86 **Rn** [222]
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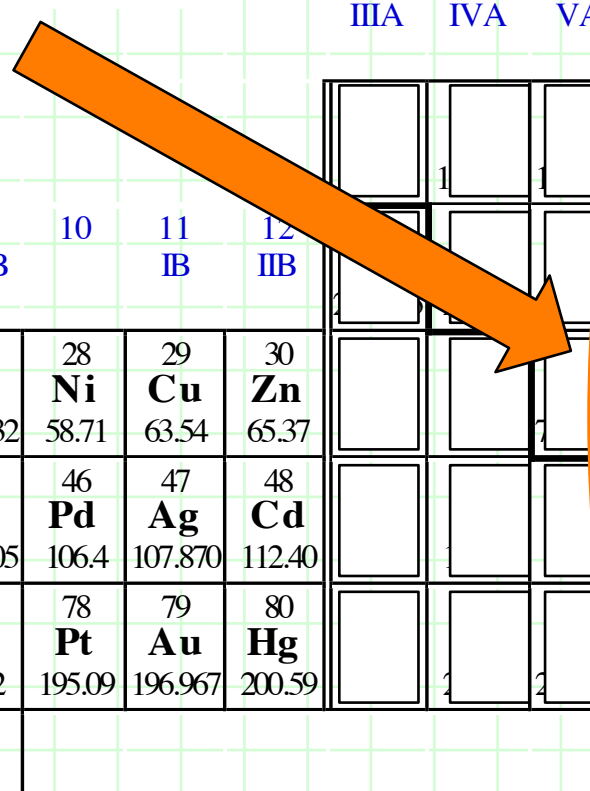
Infamous Families of the Periodic Table

The _____ FAMILY



	1 IA	2 IIA	3 IIIB	4 IVB	5 VB	6 VIB	7 VIIB	8	9 VIIIB	10	11 IB	12 IIB	13 IIIA	14 IVA	15 VA	16 VIA	17 VIIA	18 VIIIA
1	1 **H** 1.00797																	2 **He** 4.0026
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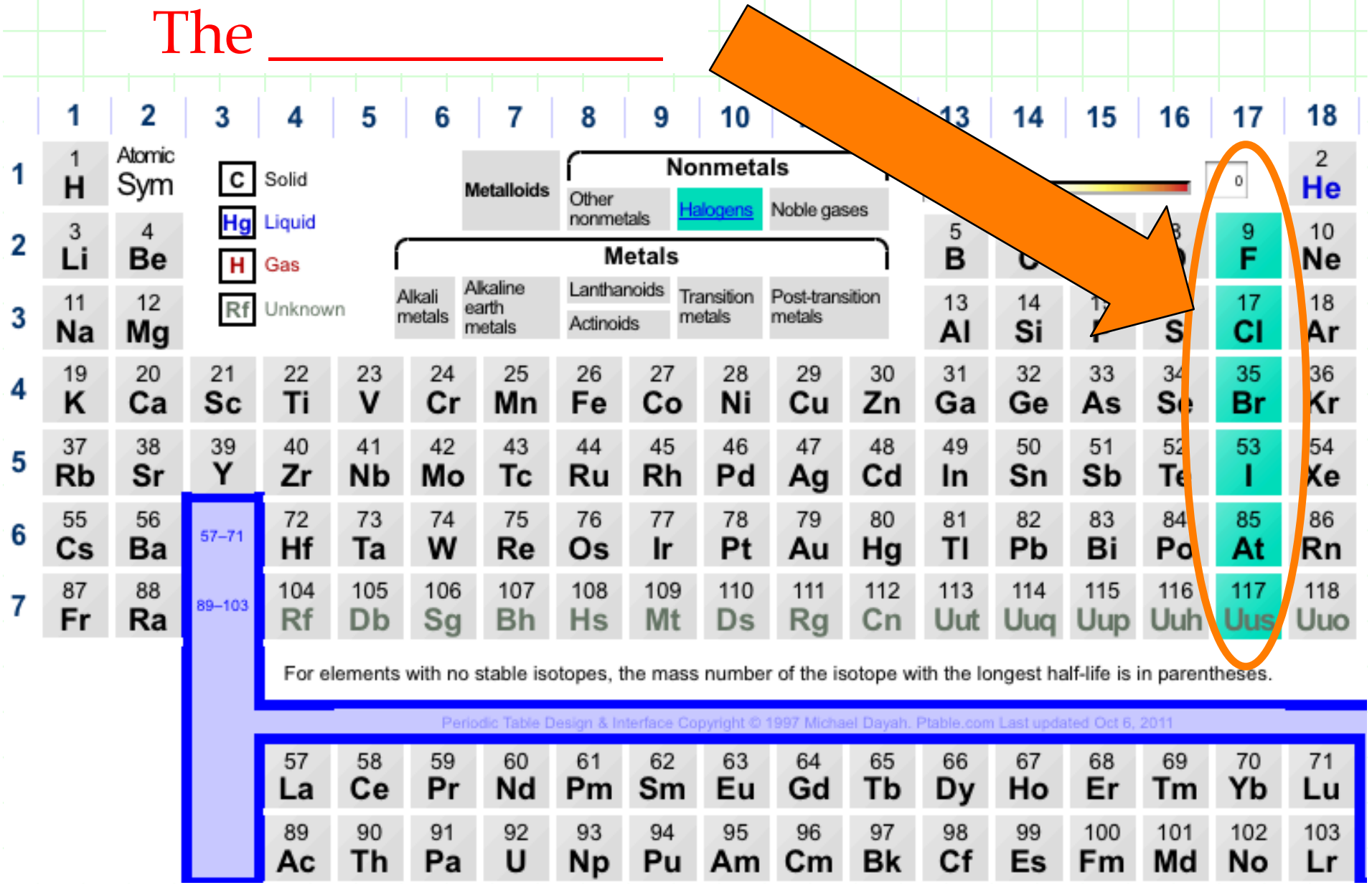
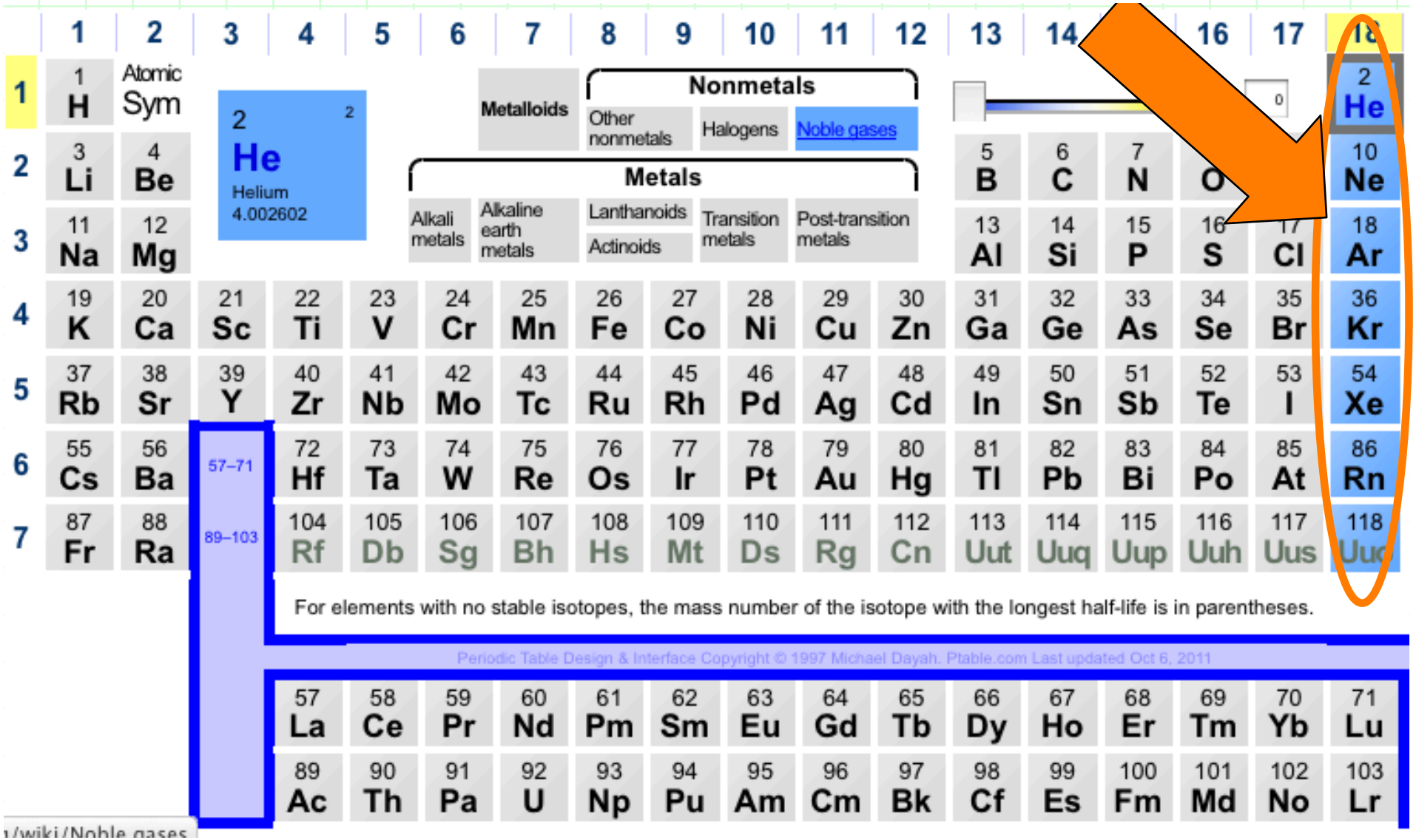
Infamous Families of the Periodic Table

The _____



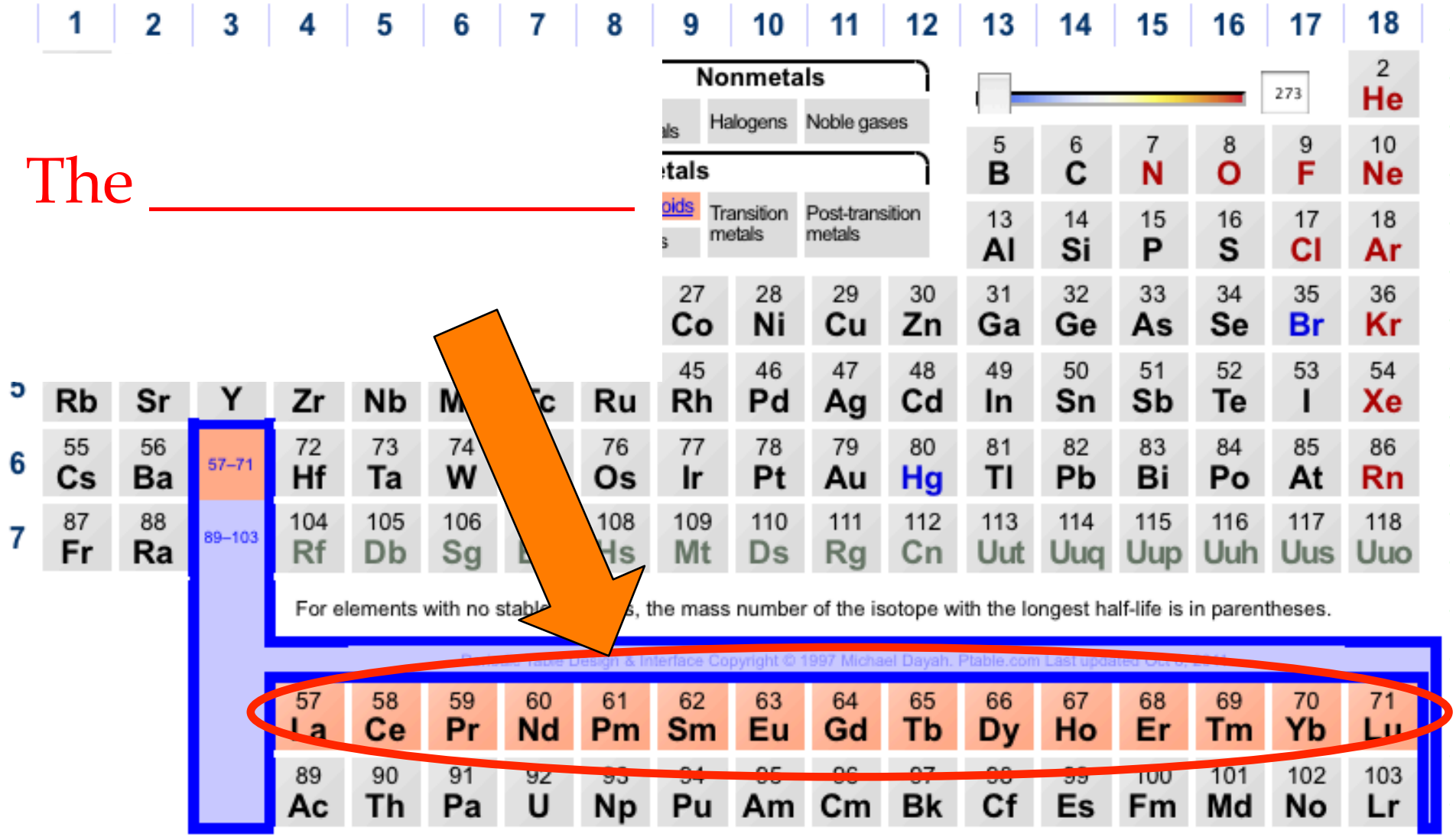
Infamous Families of the Periodic Table

The _____ _____

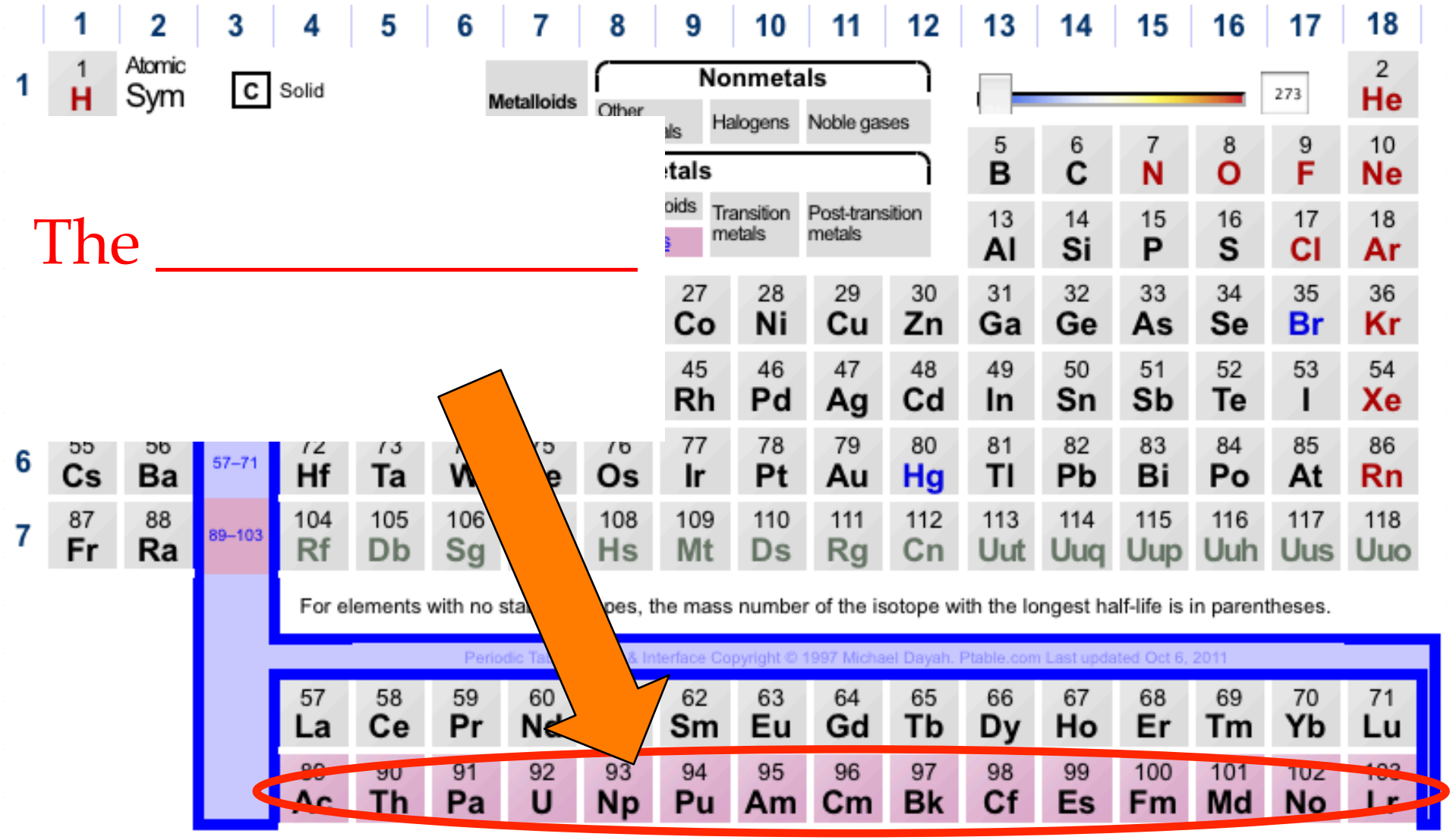


Infamous Families of the Periodic Table

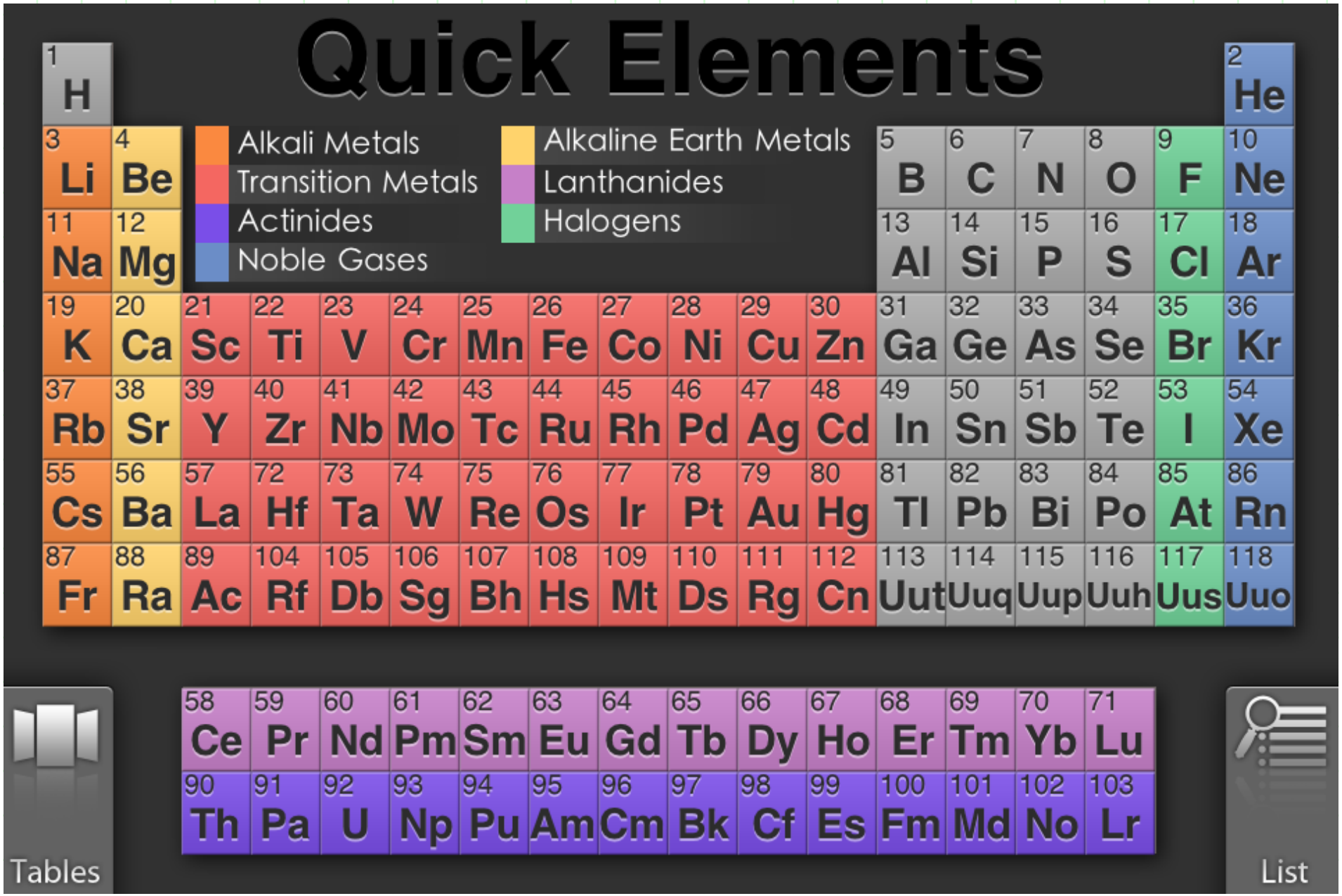
The _____



Infamous Families of the Periodic Table



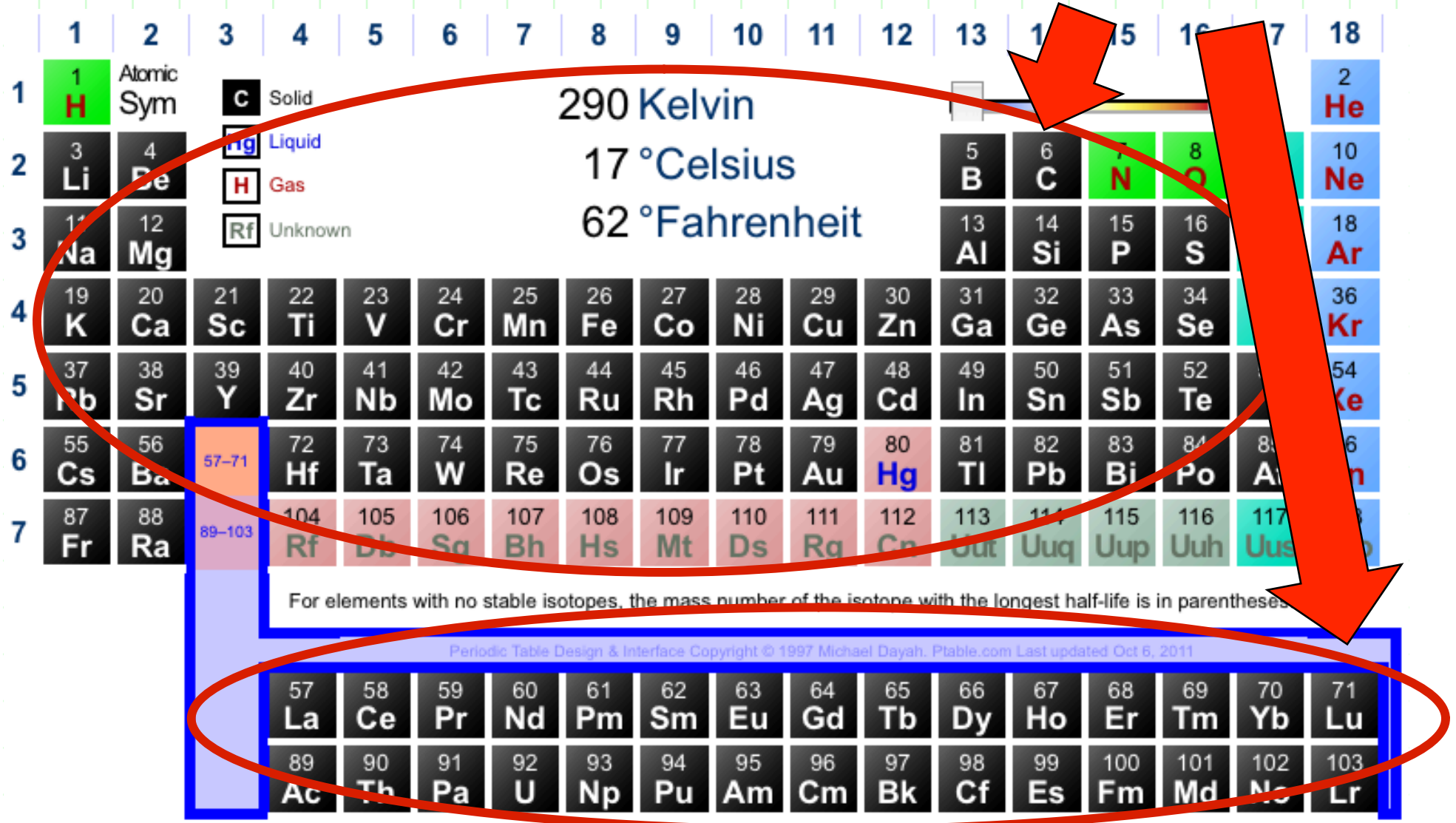
Infamous Groups / Families of the Periodic Table



How do the Elements Exist

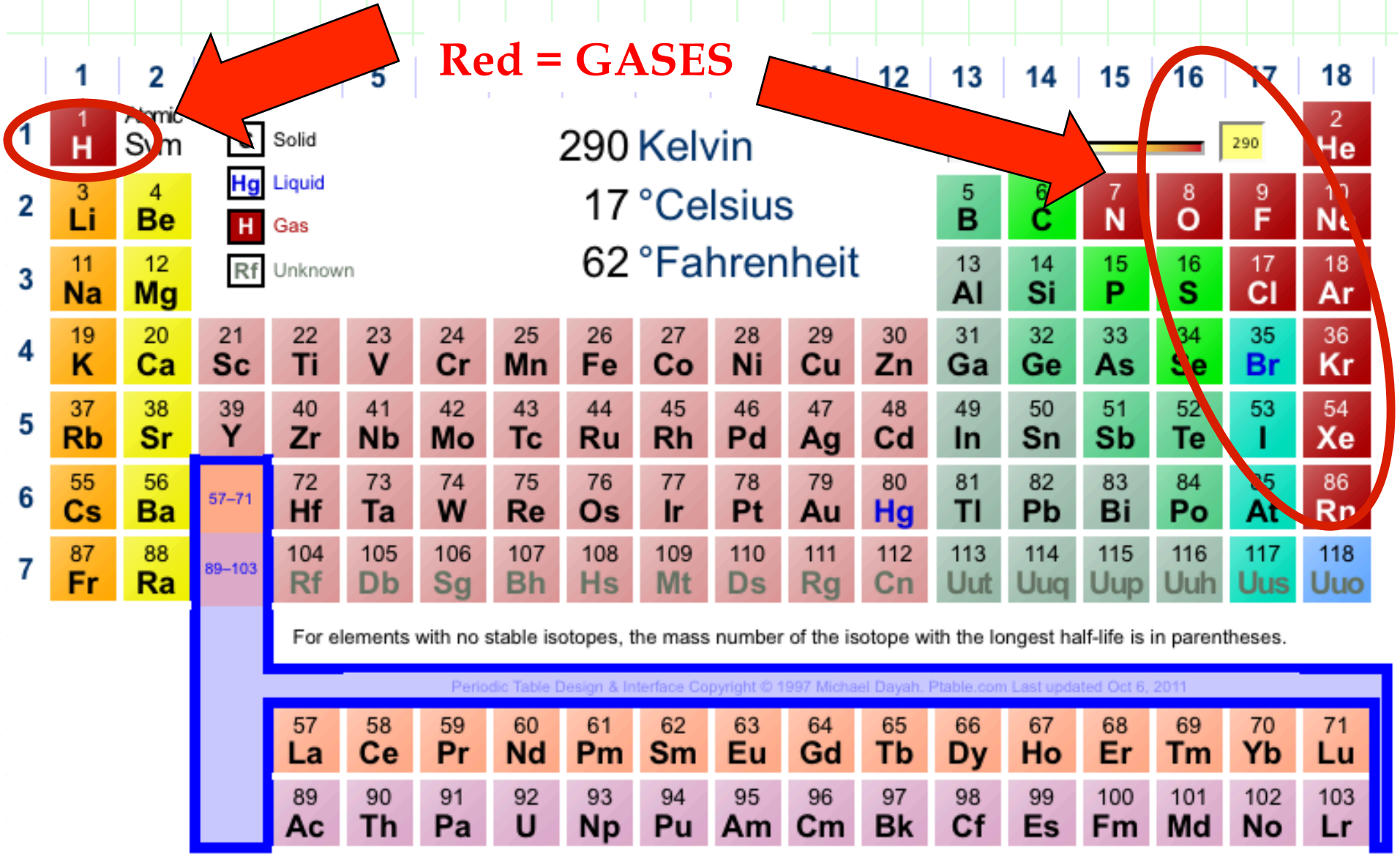
At Room Temperature (25°C)

90% are SOLIDS



How do the Elements Exist

At Room Temperature (25°C)



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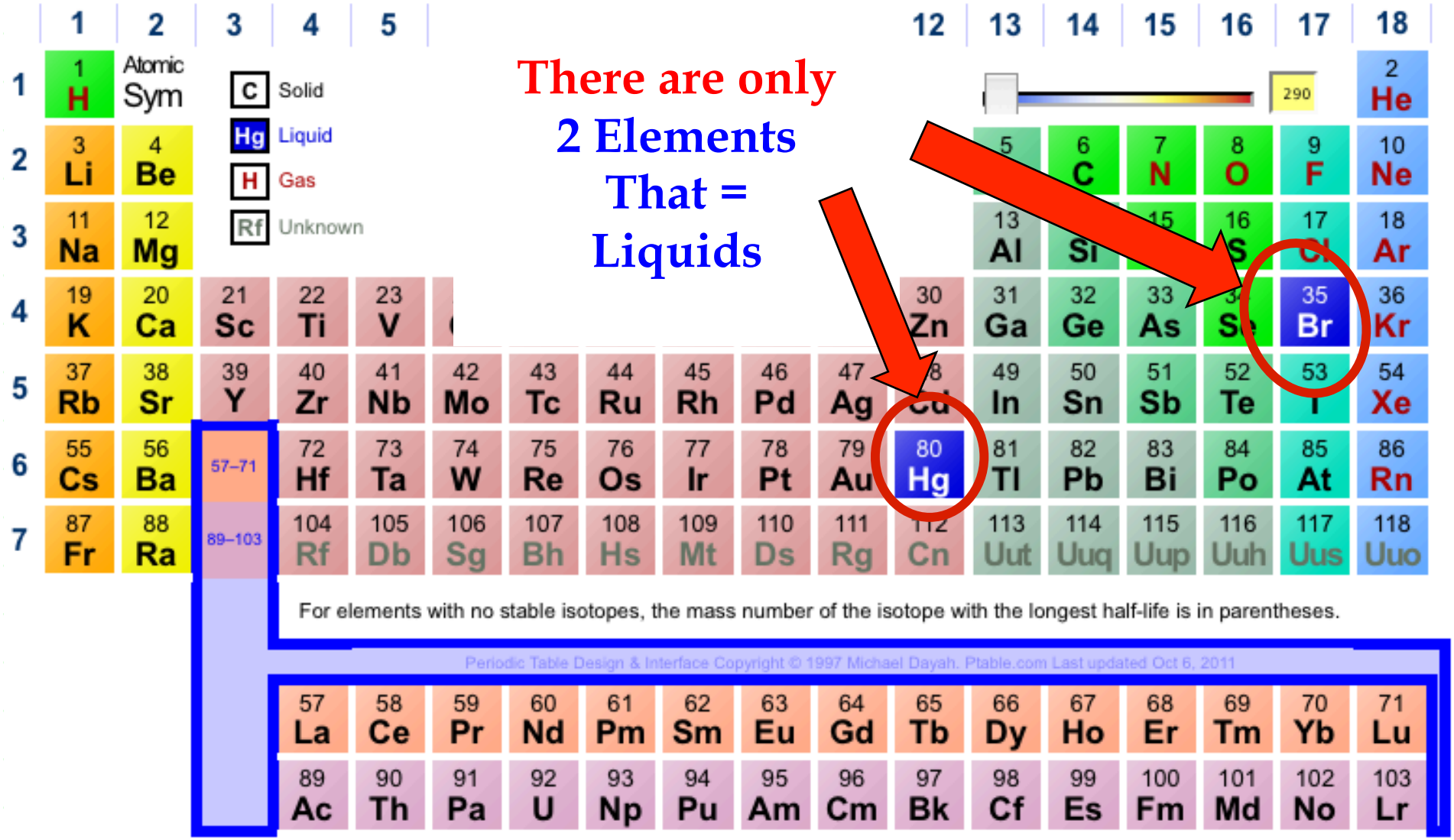

Summary

Periodic Table: Map of the Building block of matter

Type: Metal, Metalloid and Nonmetal

Family/Group: Elements in the same column have similar chemical property because of similar valence electrons

Alkali, Alkaline, Family #3 (Boron),#4 (Carbon),#5 (Nitrogen), #6 Oxygen family, Halogens, Noble gases, Transition metals, Representative (main), Rare Earth Metals (Lanthanides, Actinides)

Period: Elements in the same row have the same number of energy levels and/or electron shells.

Use this link below for an interactive and informative periodic table.

http://www.ptable.com/

Or…